

PROCEEDINGS OF THE TWENTY- SIXTH  
MEETING OF THE  
INDIAN CENTRAL COCONUT  
COMMITTEE.

HELD AT TRIVANDRUM ON THE 17th  
January, 1959









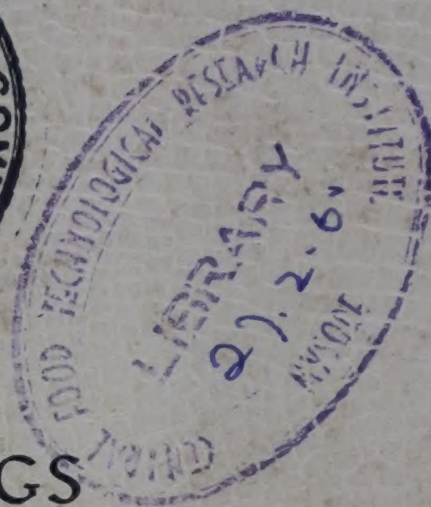






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Group photo taken on the occasion of the 26th Meeting of the Indian Central Coconut Committee, held at Trivandrum on the 17th January 1959.



Dr. M. S. Randhawa, D. Sc., I. C. S., President of the Committee, is seated fifth from left and Sri. K. P. Madhavan Nair, B. A., B. L., Vice-president, fourth from left.



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# AGENDA.

## A. General.

1. Confirmation of the proceedings of the 25th Meeting of the Indian Central Coconut Committee.
2. Changes in the Personnel of the Indian Central Coconut Committee.
3. Retirement of Members by rotation.
4. Election of the Vice-President of the Committee for the year 1959-60.
5. Appointment of the Sub-Committees for the year 1959-60.
6. Proceedings of the meeting of the Finance Sub-Committee held on 22-9-1958.
- 6A. Action taken on the suggestions made by the President in his addresses to the 23rd, 24th and 25th Meetings of the Committee.

## B. *Agricultural Research & Development Sub-Committee (Research Wing) subjects*

7. Action taken on the decisions of the 25th Meeting regarding subjects coming within the purview of the Agricultural Research and Development Sub-Committee (Research Wing.)
8. Working Paper on Coconut Research under the III, IV and V Five-Year Plans.
9. *Ad hoc* Sub-Committee to consider the question of extension of results of research - nomination of growers' representatives by President - ratification of.
10. Nomination of a Member of the Indian Central Coconut Committee on the Council of Scientific and Industrial Research.
11. Annual or biennial conferences of Coconut Research Workers.
12. Progress report on the Central Coconut Research Station, Kayangulam for the year ended 30-6-1958.
13. Progress report on the Central Coconut Research Station, Kasaragod for the year ended 30-6-1958.



14. Central Coconut Research Station, Kasaragod-observations of Prof. J. B. S. Haldane on the work of.
15. Regional Coconut Research Stations in Kerala State-review of work done at.
16. Progress report on the Regional Coconut Research Stations scheme in Kerala State for the year ended 30-6-1958.
17. Progress report on the scheme for the establishment of a Regional Coconut Research Station in Mysore State for the year ended 30-6-1958.
18. Progress Report on the scheme for the establishment of a Regional Coconut Research Station in Madras State for the year ended 30-6-1958.
19. Progress report on the Regional Coconut Research Station scheme in Andhra Pradesh for the year ended 30-6-1958.
20. Progress Report on the Regional Coconut Research Station Scheme in Bombay State for the year ended 30-6-1958.
21. Progress report on the Regional Coconut Research Station, Sakhigopal, Orissa State for the year ended 30-6-1958.
- 21A. Proposal for up-grading the post of Coconut Development Officer, Orissa.
22. Progress report on the scheme for the Investigation of the "Band" disease of the coconut palm in Bombay State for the year ended 30-6-1958.
23. Scheme for the Investigation of the Band disease of the coconut palm in Bombay State - report of the Plant Physiologist, Central Coconut Research Station, Kayangulam on.
24. Coconut Fertiliser Demonstration scheme in West Coast by Messrs. Potascheme and Parry and Company, Limited - consideration of the methods for popularising results of the scheme.
25. Coconut Fertiliser Demonstration Scheme - Proposal for the Indian Central Coconut Committee to take over certain demonstration fields.
26. Scheme for the survey of coconut pests and diseases in West Bengal.



C. *Agricultural Research and Development Sub-Committee (Development Wing) subjects.*

27. Action taken on the decisions of the 25th Meeting of the Committee on subjects coming within the purview of the Agricultural Research and Development Sub-Committee (Development Wing).
28. Increasing the production of coconut seedlings - proceedings of the Special Sub-Committee for.
29. Working Paper on Coconut Development under the III, IV and V Five-Year Plans.
30. Central Supervisory Body for the implementation of coconut schemes under the II Plan - proceedings of the III and IV meetings.
31. Coconut Nursery Scheme, Ollukkara - proposals for extension of.
32. Progress report on the coconut nursery schemes in Kerala State for the year ended 30-6-1958.
33. Progress report on the coconut nursery at Kumta (Mysore State) for the year ended 30-6-1958.
34. Final Report on the Comprehensive Coconut Nursery Scheme in Madras State.
35. Progress report on the Comprehensive Coconut Nursery Scheme in Andhra Pradesh for the year ended 30-6-1958.
36. Progress report on the Comprehensive Coconut Nursery Scheme in Orissa for the year ended 30-6-1958.
37. Progress report on the Coconut Nursery Schemes in West Bengal for the year ended 30-6-1958.
38. Scheme for the establishment of a Coconut Nursery in the northern part of West Bengal - extension of.
39. Progress report on the Parasite Breeding Stations in Kerala State for the year ended 30-6-1958.
40. Parasite Breeding Stations in Kerala State - Review of work of.
41. Scheme for the establishment of a parasite breeding station at Razole, Andhra Pradesh - proposal for the extension of.



42. Progress report on the scheme for the establishment of parasite breeding stations for the biological control of *Nephantis serinopa* in Andhra Pradesh for the year ended 30-6-1958.
43. Progress report on the scheme for the maintenance of a collection block of representative varieties of coconuts in Assam for the year ended 31-3-1958.
44. Organisation of coconut crop competition in Kerala State.
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46. Coconut Nursery Officers' Conference – holding of.

D. *Extension Sub-Committee Subjects.*

47. Extension of results of research work done at the Central Coconut Research Stations to coconut growers.

E. *Marketing and Economics Sub-Committee Subjects.*

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50. Scheme for the organisation of 3 Co-operative Coconut Marketing Societies in Andhra Pradesh.

F. *Technological Sub-Committee Subjects.*

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52. Scheme for the preparation of lauric acid from coconut oil.
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G. *Finance Sub-Committee Subjects.*

54. Action taken on the decisions of the 25th meeting of the Committee on subjects coming within the purview of the Finance Sub-Committee.
55. Amendments to Indian Central Coconut Committee Rules, 1945.
56. Indian Central Coconut Committee Provident Fund Rules – revision of.
57. Enhancement of power delegated to the Secretary regarding grant of honorarium.
58. Local purchase of Stationery – ratification of President's sanction.
59. Office of the Indian Central Coconut Committee – temporary posts of an Office Assistant, a Clerk and an Artist Photographer in the Publication Section – continuance on a long-term basis.
60. Central Commodity Committees – conditions of service to be offered to the temporary employees of the Committee appointed to posts created for a period of three years or less.
61. Ratification of President's sanction for the payment of special pay for handling cash etc. to the Assistant Accountant of the Office of the Indian Central Coconut Committee.
62. Indian Council of Agricultural Research's scheme for sale of Monographs issued by Commodity Committees – President's sanction for Indian Central Coconut Committee's participation in – ratification of.
63. Central Coconut Research Station, Kayangulam – re-fixation of the rent of the portion of the Rest House occupied by Dr. K. P. V. Menon, Director, Central Coconut Research Station, Kayangulam.
64. Central Coconut Research Station, Kayangulam – temporary post of Head Assistant – Placing on long term basis – proposal for.
65. Central Coconut Research Station, Kayangulam – Application for registering for Ph. D. degree (Research) of the Kerala University from Shri G. Bhaskaran Pillai, Research Assistant (Grade I) in Entomology – President's sanction – ratification of.



66. Central Coconut Research Station, Kasaragod - application for registering for M. Sc. Degree (Research) of the Kerala University from Shri P. L. Ramanandan, Research Assistant (Grade I) sanctioning of.
67. Central Coconut Research Station, Kasaragod-supply of furniture by Shri K. C. Kumaran, Contractor, Kozhikode - waiver of penalty.
68. Central Coconut Research Station, Kasaragod - request for additional ministerial staff.
69. Central Coconut Research Station, Kasaragod-rules regulating the use of station waggon.
70. Scheme for the establishment of coconut nurseries in Travancore - grant-in-aid statement and audit certificate for 1954-55.
71. Scheme for the establishment of a coconut nursery at Hebbal, Mysore State - Grant-in-aid statements and audit certificates for 1951-52 to 1955-56.
- 71A. Central Coconut Research Stations at Kasaragod and Kayangulam - proposal for revision of the pay scale of Laboratory Attenders at.
- 71B. Grant of house building loans to the servants of the Indian Central Coconut Committee.

H. *Scientific Appointments Sub-Committee subjects.*

72. Central Coconut Research Station, Kasaragod - filling up of certain technical posts.
- 72A. Central Coconut Research Station, Kasaragod - filling up of a post of Research Assistant, Grade I under the Second Five-Year Plan and certain technical posts under the Hormone Spraying Scheme.
73. Recommendation of the Sub-Committees other than the Finance Sub-Committee having financial Commitments.
74. Authorisation of a member of the Committee to discharge certain functions such as countersigning cheques.

I. *Any other Business.*



Proceedings of the 26th Meeting of the Indian Central Coconut Committee held at the Kanakakunnu Palace, Trivandrum at 10 A. M. on Saturday, the 17th January, 1959.

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The following were present:—

1. Dr. M. S. Randhawa (President).
2. Shri K. P. Madhavan Nair (Vice-President).
3. Dr. S. M. Sikka, Additional Agricultural Commissioner with the Government of India.
4. Shri V. Eacharan.
5. Shri K. P. Amrithanatha Iyer.
6. Shri B. M. Peter.
7. Shri R. Srinivasa Iyer.
8. Shri Abdus Shokur.
9. Shri Jagannath Misra.
10. Shri A. R. Sulaiman Sait.
11. Shri P. T. John.
12. Shri V. J. Joseph.
13. Shri C. M. John.
14. Shri N. Badruddin.
15. Shri S. R. Sabariperumal Pillai.
16. Shri C. H. Lingadevaru.
17. Shri P. B. Kurup.
18. Shri K. Sivasankara Menon, Director of Agriculture, Kerala State.
19. Shri C. R. Seshadri, Joint Director of Agriculture (Planning & Development), Madras State (representing the Director of Agriculture Madras).
20. Dr. S. R. Barooah, Joint Director of Agriculture, Assam.
21. Shri S. S. S. Venkata Rao, Coconut Research & Development Officer, Orissa.
22. Shri S. P. Mohite, Director of Agriculture, Bombay State.
23. Dr. H.C. Choudhuri, Special Officer, (Potatoes,) West Bengal (representing the Director of Agriculture, West Bengal).



24. Shri D. P. Lakshminarasimhaiah, Senior Assistant Botanist, Mysore State (representing the Director of Agriculture, Mysore State).
25. Shri K. G. Krishnan (representing Mr. A. B. Argo).
26. Dr. P. J. Gregory, Secretary.

**Co-opted Member:**

Shri B. S. Varadarajan, Secretary, Indian Central Arecanut Committee.

**Co-opted Members of the Sub-Committees:**

1. Dr. B. P. Pal, Director, Indian Agricultural Research Institute, New Delhi.
2. Shri D. Viswanatha Reddy, Joint Director of Agriculture, Andhra Pradesh, (representing the Director of Agriculture, Andhra Pradesh).
3. Shri M. P. Narasimha Rao, Oilseeds Specialist, Andhra Pradesh.
4. Shri S. G. Aiyadurai, Oilseeds Specialist, Madras State.
5. Dr. K. S. Murti, Principal, Oil Technological Institute, Anantapur.
6. Dr. G. R. Seth, Deputy Statistical Adviser, Indian Council of Agricultural Research (representing the Statistical Adviser, Indian Council of Agricultural Research).
7. The Director, Central Coconut Research Station, Kayangulam.
8. The Joint Director, Central Coconut Research Station, Kasaragod.

**Visitors:**

1. Shri C. Thomas, Secretary to the Government of Kerala, Agriculture Department.
2. Shri P.D. Nair, Retired Director of Agriculture, Kerala State.
3. Shri T. Gopalan Nair, Joint Director of Agriculture, (Research), Trivandrum.
4. Shri P. S. Mahadevan, (representing the Fertiliser Association of India).



5. Dr. S. G. Joshi, Agricultural Officer, Maharashtra Association for the Cultivation of Science, Poona.
6. Shri K. R. P. Nair, District Agricultural Officer, Trivandrum.
7. Shri K. V. Joseph, Entomologist, Agricultural College, Trivandrum.
8. Shri K. C. Cherian, Assistant Director of Statistics-in-Charge, Trivandrum.
9. Shri S. Sankara Pillai, Divisional Assistant, Comprehensive Spraying Scheme, Kerala State.
10. Shri K. Ramakrishna Pillai, Divisional Assistant, Comprehensive Spraying Scheme, Kerala State.
11. Shri T. A. Davis, Plant Physiologist, Central Coconut Research Station, Kayangulam.

The following members and co-opted members of the Sub-Committees had written to express their inability to attend the meetings:-

1. The Agricultural Marketing Adviser to the Government of India.
2. Shri A. C. Sankaranarayanan.
3. Shri A. R. M. Chakrapani Reddiar.
4. The Development Commissioner, Andhra Pradesh (Co-opted).
5. The Development Commissioner, Mysore (Co-opted.)
6. Dr. R. S. Vasudeva, Head of the Division of Mycology and Plant Pathology, Indian Agricultural Research Institute, New Delhi (Co-opted).
7. Dr. R. D. Asana, Plant Physiologist, Indian Agricultural Research Institute, New Delhi (Co-opted).
8. Dr. P. R. Mehta, Deputy Director, Plant Diseases, Directorate of Plant Protection, Quarantine and Storage, New Delhi (Co-opted).
9. The Oil Technologist, Kerala Soap Institute, Kozhikode (Co-opted).



10. The Joint Registrar of Co-operative Societies, Madras (Co-opted).
11. The Co-operative Marketing Officer, Indian Central Arecanut Committee, Kozhikode (Co-opted).
12. Shri K. A. Keraleeyan,

His Excellency Dr. B. Ramakrishna Rao, Governor of Kerala inaugurated the meeting.

Shri C. Achutha Menon, Minister for Finance and Agriculture, Kerala also addressed the meeting.

Welcoming the Governor and the Minister and others present Dr. M. S. Randhawa, D. Sc., I. C. S., Additional Secretary to the Government of India in the Ministry of Food and Agriculture and President of the Committee spoke as follows:-

Your Excellency, Shri Achutha Menon and Gentlemen,

I have great pleasure to offer Your Excellency and Shri Achutha Menon a cordial welcome to the twenty-sixth annual meeting of the Indian Central Coconut Committee. This meeting is held here in response to an invitation given by Shri Nambudiripad, Chief Minister of Kerala, at the meeting of this Committee held in January, 1958 at Calicut. As the largest coconut-growing State, there is need of close co-ordination and co-operation between this Committee and the State Department of Agriculture of Kerala and this can be achieved if there is frequent contact between the State Department of Agriculture and the officials of the Indian Central Coconut Committee. This is another reason why this meeting is held at Trivandrum. The presence of Your Excellency here as well as Shri Achutha Menon, Minister for Agriculture, is undoubtedly a source of encouragement to us and we hope that the State Government will give a prominent place to the production programme of coconut during the Second Five-Year Plan, and every effort will be made by them to achieve the targets laid.

I also take this opportunity of extending a hearty welcome to the guests who have responded to our invitation. I also extend a hearty welcome to our new

members - Shri Abdus Shokur from West Bengal, Shri Chakrapani Reddiar from Madras, Shri A. B. Argo, representative of the Bombay Chamber of Commerce, Shri C. H. Lingadevaru, growers' representative from Mysore and Dr. S. R. Barooah, Joint Director of Agriculture from Assam.

### 1958 - Year of Good Prices

I am glad to say that 1958 was a year of good prices for the coconut industry. The price of coconut oil at Cochin remained well above Rs. 2,000 per ton throughout the year and the price of coconuts ranged between Rs. 185 and Rs. 200 per thousand in the same market.

The import policy of the Government of India, as far as coconut products are concerned, has been in favour of the coconut grower. According to the import policy for the six months ending March, 1958, established importers' quota of copra and coconut oil was reduced to 20 per cent of best year's imports and "actual user's" licences were restricted to copra only on *ad hoc* basis. The policy for six months ending September, 1958, denied import licences to established importers, and allowed actual users to import copra only, as we recommended at our last meeting. This policy is continued for the half year ending March, 1959. The coconut growers should avail themselves of this opportunity for development of their coconut gardens by use of fertilisers, manures, cultivation and control of pests and diseases. The present deficit of 30 per cent of coconut production can be fully made good if the existing coconut gardens are properly manured and fertilised and where diseases are prevalent, they are sprayed.

### Advantages of manuring and cultivation

It would be advantageous in this connection to draw pointed attention to the results of experiments conducted in this regard at the Central Coconut Research Station, Kasaragod. It has been demonstrated that highest yield is obtained from plots under regular cultivation and manuring, that completely neglected plots show the least yield and that plots regularly cultivated but not manured yield considerably more than neglected



plots, but not so much as plots receiving both cultivation and manuring. It has been calculated that the net profit per tree receiving both cultivation and manuring is Rs. 6.58 while a tree in the plot receiving cultivation only gives a net profit of Rs. 6.12 while the neglected tree gives a net profit of Rs. 3.42 only. Thus an additional profit of Rs. 190 can be earned by regular cultivation and manuring from an acre with 60 trees and Rs. 160 as additional profit from such an acre by cultivation alone.

When I see large number of young men sitting idle at all sorts of places I feel disappointed. My advice to them would be, "Go and cultivate your gardens. This will give you good health and also provide you with additional income, and the country the extra production of coconuts which is so badly required". I suggest that cultivation of coconut gardens and their manuring should be taken up on a campaign basis in the States of Kerala, Mysore and Assam.

### Use of Manures and Fertilisers

The campaign for planting of *Glyricidia* which was taken up on a mass scale in the State of Kerala deserves particular mention. I am glad that good work was done during this campaign, which should be intensified during this year. In fact, even legislation should be enacted so that on the boundaries of coconut gardens, *Glyricidia* is grown as a green manure crop. Apart from providing green manure its flowers will also beautify the countryside. It would help not only agriculture, but also tourism, for *Glyricidia* in flower adds charm to the landscape.

It has to be admitted with regret that when schemes for coconut development were drawn up under the Second Five-Year Plan, proper emphasis on manuring was not laid with the result that there is no plan or target for this aspect of development. It has, therefore, been decided to intensify this work during the next 15 years and in the Working Paper on Coconut Development during the Third, Fourth and Fifth Five-Year Plans which you will find included in the agenda of this

meeting, provision has been made for the supply of fertilisers to coconut growers in all the States concerned. Seen from the larger national point of view this aspect of coconut development has a great significance. We are today importing coconuts and coconut products worth about Rs. 15 crores per annum. We can hope to arrest this drain of money from the country if we produce all the coconuts we need with a regular programme for manuring coconut gardens.

### **Control of Pests**

Pests of coconut palm such as the rhinoceros beetle and *Nephantis serinopa* are common and cause considerable damage to the coconut crop. Very effective remedies have been evolved to control these and other pests at the Central Coconut Research Station, Kayangulam. The destruction of these pests should be taken up on a campaign basis by the State Governments concerned.

### **Spraying of Coconuts to Control Leaf Disease**

Remedies have been devised for some of the diseases of the coconut also. For example, it has been demonstrated that the leaf disease of the coconut which is prevalent over an area of about 1,00,000 acres in South Kerala can be controlled by spraying the leaves twice or thrice a year with a copper fungicide. The Kerala Government are tackling this problem in a practical manner by arranging for the spraying of the palms in the diseased area through the agency of their Agriculture Department. While some very creditable work is thus being done, we have to realise the fact that this spraying has to be continued for many years to come. We should, therefore, start thinking of ways and means of getting it done ultimately by the cultivators themselves as a regular agricultural operation like manuring and cultivation. In the meantime, it appears that the work now being done in Kerala departmentally will have to be continued under the Third and subsequent Plans until the farmers themselves take up this work.

### **Supply of quality seedlings**

The points I have adverted to just now are calculated to step up production immediately, that is to say, in



two or three years, for it takes that much time for the results of manuring etc., to make themselves manifest in terms of yield in the case of the coconut palm. There are, however, certain long-term measures which, if adopted now, will start yielding results ten years hence. The supply of quality coconut seedlings to cultivators is a very important item in this long-term programme. At its last meeting the Committee set up a special Sub-Committee to go into the whole question of production of coconut seedlings. The report of the Sub-Committee is before this meeting. It has estimated that for purposes of underplanting alone, about 9.49 lakhs of seedlings per annum, and that for a modest programme of planting a new area of 5,333 acres per annum another 3.20 lakhs seedlings will be required. If optimum production in coconut gardens is to be maintained, there must exist a regular programme for under-planting with quality seedlings. We have every reason to believe that when the existing coconut gardens were first raised, not much attention had been paid to the quality of the seedlings planted. We now have evolved certain methods of selecting parent palms, seednuts, seedlings, etc. and we have to see to it that the seedlings used by the cultivators, hereafter, be they for under-planting or new planting, are only quality ones. The State Governments have been invited to present proposals for raising the required number of seedlings. I would earnestly request them to give this matter serious and urgent thought so that the production and distribution of quality seedlings in the required numbers may start as early as possible.

### **Selection of mother palms and raising of progeny gardens**

Selection of mother palms is a very important measure to which we must pay urgent attention in the States of Kerala, Mysore, Madras, West Bengal and Assam. A survey should be made by the State Agricultural Officers to locate high bearing mother palms. They should be marked and district and State-wise registers should be maintained showing their ownership and location. The Indian Central Coconut Committee

may award prizes also to the owners of such mother palms so that they take good care of them. Nuts from these mother palms alone should be taken for propagation and planting in new areas so that they develop into progeny gardens.

### **Control over Private Nurseries**

There are a large number of private nurseries which also raise coconut seedlings. We have not taken any census of these nurseries. The Indian Central Coconut Committee and the State departments of Agriculture should keep in touch with their work and should ascertain how many seedlings they are raising. They should also be brought in our mother palm selection programme. We should also see that healthy plants are raised in these nurseries and they take steps to spray their plant material. All this can only be effected if the State Governments enact legislation in which they lay down minimum requirements for these nurseries. Sale of plants should only be permitted to such of the nurseries which comply with the requirements laid down by the Indian Central Coconut Committee in consultation with the State Governments. I would suggest that a small Sub-Committee should study this problem and recommend model legislation for the State Governments.

### **Planting up of coconuts in new areas**

Another long-term measure is the planting up of new areas. Suitable waste lands, the bunds of paddy fields, the banks of irrigation canals and channels all can be planted up with coconut. In the Working Plan on Coconut Development during the Third, Fourth and Fifth Five-Year Plans, it has been suggested to bring under coconut new area of 20,000 acres during the Third Plan and 16,000 acres under each of the Fourth and the Fifth Plans. In this connection I have pleasure to state that the Madras Government have sanctioned a scheme to plant 50,000 seedlings on the banks of canals in the State. This is a forward step which I would commend to the other States for emulation.



## Coconut Monograph and Coconut Atlas

I am glad to say that both the Coconut Monograph and Coconut Atlas have been printed. I congratulate the Secretary, Indian Central Coconut Committee, Dr. Gregory for the interest he has taken in the production of these two books. I further congratulate both Dr. K. P.V. Menon and Dr. K.M. Pandalai and their co-workers for the excellent work they have done in compiling the Monograph on Coconut Palm. I am sure it will be useful to the students and research workers for study and reference and will also provide incentive for fresh research.

In the end I thank you, Sir and Shri Achutha Menon, Minister for Agriculture, for having so kindly consented to be with us today. I cordially thank the State Government for the excellent arrangements they have made for this meeting. Shri K. Sivasankara Menon, Director of Agriculture and Shri C. Thomas, Secretary, for Agriculture have taken great pains to make this meeting a success and I convey the cordial thanks of the Indian Central Coconut Committee to them for the good work which they have done.

Now, I request Shri Achutha Menon to kindly address the members of this Committee.

### MINISTER'S ADDRESS

Addressing the Meeting *Shri C. Achutha Menon*, spoke as follows:—

Your Excellency, Mr. Chairman and other members of the Indian Central Coconut Committee and friends,

I have great pleasure to extend to you, on behalf of the Government of Kerala, a most hearty welcome.

Kerala is traditionally the land of coconuts. About 10 lakhs of acres in Kerala are cultivated with coconuts. It forms about two-thirds of the entire area under coconut in the Indian Union. The coconut palm is of utmost importance in the economy of Kerala. Almost all parts of the tree and its fruit are put to one use or other and therefore it can truly be said that the coconut palm is the “Kalpavriksha” of the Kerala people.

## **Increasing Production**

India is not in a position to produce all the coconuts required for our industrial and other purposes. Therefore, every year large quantities of oil and copra are being imported. It is clear, therefore, that there is very great scope for increased production of coconut. The land in Kerala is most suitable for growing coconuts and the people have through long years acquired the necessary skill in rearing up the palm. In spite of these favourable circumstances our production does not cope up with the demand. I am sure the Indian Central Coconut Committee are aware of this problem and I hope they will devote their attention to the question of increasing the yield of coconut trees as well as the acreage under the crop. No doubt the important results that have been achieved as a result of the research work done in the various centres under the Committee have contributed a great deal to the improvement of production. But still greater efforts are required to achieve our aim of increased production.

## **Leaf and Root Disease**

Although Kerala is the most important coconut producing area in the Indian Union, our State is faced with a very great problem which threatens to blast the entire future of the coconut tree in Kerala. I am referring to the leaf and root disease that is prevalent in the entire Travancore area and part of the Cochin area also of Kerala State. In several taluks in these parts lakhs and lakhs of trees are affected by this disease which has affected the production of nuts very much. As a result of the attack the yield of a tree is entirely lost. In certain areas it is a heart-rending sight to see not a single coconut palm which is free from the attack of this disease. Thousands of small cultivators in Kerala who have staked their everything in rearing up their favourite coconut garden and who are entirely dependent upon its produce have been thrown to despair, because as yet no completely effective remedy has been found for the disease. No doubt the State Government have launched a Comprehensive Spraying Scheme in order to protect the trees from this disease. We have been carrying on



this programme for the last three years. Two sprayings are done every year and this has to be continued for three years consecutively. Already 136 lakhs of sprayings have been done and the programme is being pushed through vigorously. The State Government is doing this on a subsidised basis, that is to say, the Government are bearing 6 naye paise out of 12 naye paise which is reckoned to be the average cost of spraying one coconut tree. The other 6 naye paise is recovered from the cultivator. Already we have spent more than 20 lakhs of rupees for this programme.

### **Need for Manuring**

If this programme is to be successful it has to be accompanied by proper manuring of trees. It has been found from experience that a properly manured tree will have sufficient strength and virility to withstand the disease. Even if the disease cannot be eradicated the tree improves very much in health and the normal yield can be expected from a tree which is treated simultaneously with spraying and fertilising. It is a sad fact that the majority of small cultivators of Kerala are not in a position to use fertilisers and manures for their palms. Thus it may be stated that the huge efforts that are being made in the direction of comprehensive spraying are partly wasted. If only we could supply the coconut cultivators fertilisers costing about one rupee per tree as a medium-term loan to be recovered in easy instalments from the third year onwards there will be considerable improvement in the yield of coconut trees and overall production of coconut in Kerala. But this will involve an expenditure of crores of rupees which the State Government is not in a position to bear. We have in fact prepared the skeleton of a scheme on the lines described above, but it has not been put into practice owing to paucity of funds. I do not see any possibility of immediately taking up this programme during the course of the Second Five-Year Plan. It is our earnest hope that during the course of the Third Five-Year Plan at least we will be able to take up this scheme.



### **Scheme to Plant up Sandy Area**

Another fruitful and attractive scheme that the State Government have prepared for the increased production of coconut is the scheme for planting about 10,000 acres of sandy uncultivated land in the Trivandrum District with coconuts. The scheme is to give loans to ryots for digging wells and laying out roads and other communications etc. and supplying good seedlings. This scheme also involves an expenditure of a crore of rupees spread over a period of ten years. We had in fact proposed starting a pilot scheme of 100 acres in this area during the year 1959-60 at a cost of about 6 lakhs of rupees. But this was turned down by the Planning Commission as an item which has not been included in the Five-Year Plan and for reasons of economy. I hope this also will be taken up at least in the Third Five-Year Plan.

### **Coconut Research**

The State Government are thankful to the Indian Central Coconut Committee for their care and attention to the Central Research Stations at Kasaragod and Kayangulam. These two premier Research Stations have done yeoman service in the cause of coconut research. They have reared up a generation of research workers whose dedication to duty and knowledge of science will be a great asset for the future development of our land.

Besides the Research Stations mentioned above, we have a group of Research Stations in Nileshtar with a stock of innumerable varieties of coconut palms gathered from all over the world. Considerable research work is in progress in this station to evolve an economic variety of the coconut palm with a short pre-bearing period combined with heavy yield. This group of Research Stations in Nileshtar also tackles the agronomic problems of coconut cultivation in different soils. Under the aegis of the Indian Central Coconut Committee we have been running three Research Stations for the last ten years at Thodupuzha, Kumarakom and Neyyattinkara for studying agronomic problems which are peculiar to the different terrains in this tract. The



stations at Kumarakom and Neyyattinkara are continuing their useful activities. I understand that the work will be reviewed by this Committee and I am expecting useful suggestions for their improvement. The station at Thodupuzha was discontinued in accordance with the report of an Expert Sub-Committee of the Indian Central Coconut Committee. We hope that a new Regional Research Station in another tract of the State will be started in lieu of the one at Thodupuzha. The State Government will be ready to render whatever facilities that are required for starting it.

### **Production of Quality Seedlings**

There is need for production of a very large quantity of good seedlings. A considerable part of the yielding trees at present are not good and we must have a definite programme by which during the course of a number of years the entire coconut area will be replanted with the best kind of trees suitable to our conditions. About 7 lakhs of seedlings are reckoned to be necessary annually for planting purposes in Kerala. We have already established 15 nurseries all over the State producing about 2.5 lakhs of seedlings per annum. Our target is 4 lakhs of seedlings per annum by the end of the Second Five-Year Plan. This target will no doubt be reached; but as I have pointed out above, this is still inadequate in view of our large requirements. We are, therefore, encouraging starting of small nurseries in the N. E. S. Blocks. There is a complaint that the preparation and conduct of these nurseries are not always done properly. I hope the Indian Central Coconut Committee will help us to organise a system of inspection by which we can make sure that all the processes connected with the proper selection of seednuts, method of planting etc. are observed in these nurseries and only the best seedlings are produced.

We have laid down 234 demonstration plots in 39 taluks of the State in order to popularise the correct method of manuring coconut gardens. These plots are becoming so popular that there is a very great response from the growers.

## Assurance of a Steady Price

During recent weeks there was a temporary fall in the price of coconuts for a few days which sent a panic in the heart of coconut growers. We are very anxious that a steady price is assured to the coconut growers. We are grateful to the Indian Central Coconut Committee for having always championed the cause of coconut growers in Kerala and other places in India. I hope the Central Government will keep a watchful eye on coconut prices and do the needful in order to assure a reasonable price for coconut growers.

I have touched upon only one or two among the most important problems of the coconut growers. I hope the Committee will direct its attention to other important problems also and I am sure that the deliberations of the Committee will be of immense help to the coconut growers of this State. I wish the Committee all success in their endeavour.

## GOVERNOR'S INAUGURAL ADDRESS

Inaugurating the meeting *His Excellency Dr. B. Ramakrishna Rao*, Governor said:—

Dr. Randhawa, Members of the Indian Central Coconut Committee and Gentlemen,

When the invitation to inaugurate this plenary session of the Indian Central Coconut Committee came to me, I readily accepted the invitation, for I felt that here lay an opportunity for me to come into direct contact with those responsible for the development of a crop which is so vital to the economy of Kerala.

## Importance of Coconut for Kerala

If in the remote past this part of India came to be called Kerala because the tall and beautiful *Kera* trees dominated the landscape, today that name for this State has become more significant than ever, for the economy of Kerala today is virtually dependent on the *Kera Vriksha* and its products. Although it may seem like carrying coal to Newcastle, I still would like to recount here certain basic facts relating to Kerala *vis-a-vis* the Indian coconut industry. Kerala has about 11 lakhs of



acres under coconut which is about 70 per cent of the Indian acreage under this perennial crop. She produces about 310 crores of nuts per annum which is about 70 per cent of the total Indian production. Of the Indian production of about 2,30,000 tons of milling copra nearly all is made in the villages of Kerala and of 900 power mills that crush copra in this country, more than 700 or about 80 per cent are in Kerala. The coir industry built on the fibre of the coconut husk is almost exclusively in Kerala too. The lives of lakhs and lakhs of people in Kerala are inextricably bound up with the fortunes of the coconut industry and its development is therefore to them a matter of the profoundest importance.

### **The activities of the Committee**

I was listening with great interest to Dr. Randhawa's reference to the various problems of the coconut industry and how they are sought to be tackled. The Central Coconut Committee has set for itself the laudable objective of self-sufficiency for India in coconuts and coconut products and is directing its activities to bring about the speedy realisation of this objective through a variety of ways which include research on the breeding of better varieties of the palm, eradication of pests and diseases, supply of quality seedlings to cultivators, propaganda regarding better methods of cultivation etc. It is really going to be a race between the producers of coconuts on the one hand and the consumers on the other. It would appear that for the present the consumers' demands are rising at a rate which is faster than the production rate. This is, however, not to say that we should despair of achieving self-sufficiency. On the contrary the prospect should be a challenge to every coconut grower to make the resolve that he would grow two coconuts where one grew before.

### **How to increase production**

That takes us to the crux of the whole problem. How are we to ensure that coconut growers who are mostly small holders with little or no resources to fall back upon, are enabled to carry out such a resolve? The coconut palm is generous in its response to proper

treatment. As Dr. Randhawa said in his speech, regular cultivation and manuring and timely control of pests and diseases will result in a significant increase in production. It would, therefore, seem that what we immediately require is some kind of efficient arrangement by which the coconut growers, big and small, all over the country, are supplied with the necessary manures and credit for undertaking the above operations. The capacity of resistance to disease is just like that of human beings. If the trees are properly looked after and treated and if they get facilities at the proper time, I am sure, they will have greater power of resistance to the pests and diseases which we are trying to overcome by spraying and other methods. Spraying has been resorted to in the State on a large scale, but the attempts that have been made so far are not adequate to meet the requirements of the cultivators. I have seen several coconut palms on the road-side while travelling, all affected by pests and I think greater attention will have to be paid to more intensive supply of manure and to afford more facilities for the coconut growers. I am sure that so far as Kerala is concerned, the small coconut growers, or coconut growers in general, ought to be treated on a par with the paddy growers. The Agricultural Department is trying to give manure, etc., to the growers of food crops. The same treatment should be given to the coconut growers so far as this State is concerned. I do not think it would be a tall claim to make for the coconut growers of Kerala and I think the demand should be sympathetically considered by the Planning Commission and the Government of India in view of the great economic importance of coconut production in this State. I am sure that this will engage the serious attention of the Committee during its forthcoming deliberations.

Dr. Randhawa was referring to the necessity of enacting certain legislative measures. I am not quite sure how and to what extent legislation can be undertaken with a view to enforcing cultivation of *Glyricidia* on lands and fields. Even if legislation is undertaken, it has to be considered, how much and how far it would be practical to enforce that legislation. It requires



careful thinking. Similarly, I think, the suggestion he made for the other enactments deserves very serious consideration. Probably, the second one is easier than the first one which he has suggested for the purpose of enforcing, namely, the plantation of *Glyricidia*. However, this is a matter which may come up for discussion before the forthcoming deliberations of this Committee.

### **Kerala's Role in Increasing Production**

Kerala, being the most important State in India as far as coconut area and production are concerned, has to take a leading part in implementing the results of research so as to increase the production of this valuable commodity. As you may be aware the Government of Kerala have launched a comprehensive spraying campaign to combat the leaf disease of the coconut which has been causing great havoc in an area of about 1,00,000 acres spread over 22 taluks of the State. But it has been stated by experts that in addition to spraying, the diseased trees should be manured also so that they may give optimum yield.

It may be useful to examine what kind of concessions could be given to coconut growers in the matter of the purchase of manures, pesticides, sprayers etc. Although coconut oil enters industry to some extent, particularly for the manufacture of soaps and hair oil, it has to be remembered that coconut is primarily and fundamentally an essential article of food in Kerala. About 80 per cent of the country's production of nuts is used for edible purposes - 54 per cent as fresh nuts, 10 per cent as edible copra and 16 per cent as edible oil. It would, therefore, seem only appropriate that concessions of the type given to cultivators of other food crops are extended also to growers of coconut.

I shall not take up more of your time. I have now great pleasure to inaugurate this the twenty-sixth plenary session of the Indian Central Coconut Committee. I thank you for inviting me to inaugurate this session.

Jai Hind !

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### Thanksgiving

*Shri K. P. Madhavan Nair*, Vice-President of the Committee, thanking the Governor, the Minister and others for attending the inaugural function, suggested that in the National Extension Service Blocks, where at present a large number of activities were going on, it would be desirable to limit the functions under the agricultural programme to the major crop of the block concerned. In Kerala extension of coconut cultivation was no longer possible, but intensive cultivation could be done. This aspect of work would be taken up by the agricultural personnel of the NES Blocks.

Continuing, *Shri Madhavan Nair* said that they had found from actual experience that spraying of the coconut palms was beneficial in controlling the leaf disease. This had to be done on a well-planned and fairly long-term basis. Gradually it must be passed on to the cultivators themselves. The disease was spreading to new areas and to control it effectively it was necessary to do spraying in a very systematic manner from one end of the State to the other.

Referring to the need to remove uneconomic palms and to plant quality coconut seedlings *Shri Madhavan Nair* said that this work could be taken up in the National Extension Service Blocks.

He said that the concessions regarding supply of manures given to cultivators of food crops should be given to coconut growers also.

*Shri Madhavan Nair* recalled that it was for the third time that the Committee was holding its meeting at Trivandrum and said that the State Government had been showing great interest in the Committee and helping it to a certain extent. For example, they had met half the cost of buildings and land in setting up the Central Coconut Research Station at Kayangulam.

*Shri Madhavan Nair* concluded by thanking the State Government for their continued assistance to the Committee and the Governor, the Minister and others for responding to the Committee's invitation.



### Decisions of the Committee

*Subject No. 1.* Confirmation of the minutes of the 25th Meeting of the Indian Central Coconut Committee.

The Minutes of the 25th meeting of the Committee were approved.

*Subject No. 2.* Changes in the personnel of the Indian Central Coconut Committee.

The Committee took note of the fact that the Governments of West Bengal and Madras had nominated to the Committee Shri Abdus Shokur and Shri A. R. M. Chakrapani Reddiar respectively in place of Shri D. N. Mukherjee and Shri P. Balarama Kurup whose term of office expired on 31-3-1958.

The Committee also noted that Shri C. M. John and Shri P. B. Kurup had been nominated to the Committee by the Government of India, that Shri C. H. Lingadevaru had been nominated by the Mysore Government in place of Shri V. Venkatappa whose term of office expired on 31-3-'57, that the Director of Agriculture, Kerala had been nominated by the Kerala Government in place of Shri M. Abdussalam who resigned his membership on 17-1-1958, that Mr. A. B. Argo had been nominated by the Bombay Chamber of Commerce in place of Mr. C. E. Bingham who had left India in May 1958, and that Dr. S. R. Barooah had been nominated by the Assam Government in the place of Shri Sarojendu Dutta.

*Subject No. 3.* Retirement of Members by rotation.

The Committee noted that Sarvashri R. Srinivasa Iyer, A. T. Patil, K. P. Madhavan Nair, A. R. M. Chakrapani Reddiar, Mallaraj Urs, S. S. S. V. Rao, V. J. Joseph, Drs. H. K. Nandi and S. R. Barooah, the Directors of Agriculture, Madras and Bombay, the Agricultural Commissioner with the Government of India, the Additional Agricultural Commissioner with the Government of India and the Joint Secretary of the Government of India, Ministry of Finance (Agriculture Division) were due to retire on 31-3-1959.

*Subject No. 4.* Election of Vice-President, Indian Central Coconut Committee for the year 1959-60.

Shri V. Eacharan proposing and Shri K. P. Amri-  
thanatha Iyer seconding, Shri K. P. Madhavan Nair was  
unanimously re-elected Vice-President of the Committee  
for 1959-60.

*Subject No. 5.* Appointment of Sub-Committees for  
the year 1959-60.

The Committee set up the following Sub-Committees  
for the 12 months from the 1st May 1959:-

**I. Finance Sub-Committee.**

1. The Vice-President (Chairman-*Ex-Officio*).
2. The President (Member-*Ex-Officio*).
3. Shri V. Eacharan.
4. Shri A. R. Sulaiman Sait.
5. Shri B. M. Peter.
6. Shri V. J. Joseph.
7. Shri P. B. Kurup.
8. The Director of Agriculture, Kerala.
9. Shri C. H. Lingadevaru.
10. Shri T. Bhaskara Rao.
11. The Secretary.

**II. Agricultural Research & Development Sub-Com-  
mittee (Research Wing).**

1. The Director, Indian Agricultural Research In-  
stitute (Co-opted), Chairman.
2. The President.
3. The Vice-President.
4. The Head of the Division of Mycology, Indian  
Agricultural Research Institute (Co-opted).
5. The Head of the Division of Plant Physiology,  
Indian Agricultural Research Institute (Co-  
opted).
6. The Head of the Division of Entomology,  
Indian Agricultural Research Institute (Co-  
opted).



7. The Statistical Adviser to the Indian Council of Agricultural Research (Co-opted).
8. The Secretary, Indian Central Arecanut Committee, (Co-opted).
9. The Director of Agriculture, Kerala.
10. The Director, Central Coconut Research Station, Kayangulam (Co-opted).
11. The Joint Director, Central Coconut Research Station, Kasaragod (Co-opted).
12. Shri C. M. John.
13. The Oil Seeds Specialist, Madras (Co-opted).
14. The Deputy Director of Agriculture, (Research) Andhra Pradesh.
15. The Oil Seeds Specialist, Andhra Pradesh (Co-opted).
16. The Director of Agriculture, Madras.
17. The Director of Agriculture, Mysore.
18. The Arecanut Specialist (Co-opted).
19. The Director of Agriculture, Bombay or his representative.
20. Dr. S. R. Barooah.
21. Dr. H. C. Choudhury (Co-opted).
22. The Secretary.

### **III. The Agricultural Research & Development Sub-Committee (Development Wing).**

1. The Agricultural Commissioner with the Government of India (Chairman).
2. The President.
3. The Vice-President.
4. The Additional Agricultural Commissioner with the Government of India
5. The Director of Agriculture, Madras.
6. The Director of Agriculture, Kerala.
7. The Director of Agriculture, Mysore.
8. The Development Commissioner, Madras (Co-opted).
9. The Development Commissioner, Kerala (Co-opted),

10. The Director of Agriculture, Andhra Pradesh (Co-opted).
11. The Development Commissioner, Mysore (Co-opted).
12. Shri B. M. Peter.
13. Shri Sabariperumal Pillai.
14. Shri K. P. Amrithanatha Iyer.
15. Shri C. H. Lingadevaru.
16. Shri Jagannath Misra.
17. Shri Alluri Satyanarayana Raju.
18. Shri Abdus Shokur.
19. Shri A. C. Sankaranarayanan.
20. Shri R. Srinivasa Iyer.
21. Dr. P. R. Mehta, Deputy Director (Plant diseases), Directorate of Plant Protection, Quarantine and Storage (Co-opted).
22. The Oil Seeds Specialist, Andhra Pradesh (Co-opted).
23. The Secretary.

#### **IV. Marketing and Economics Sub-Committee.**

1. The President — Chairman.
2. The Vice-President.
3. The Agricultural Commissioner with the Government of India.
4. The Agricultural Marketing Adviser to the Government of India.
5. The Director of Agriculture, Mysore.
6. The Director of Agriculture, Madras.
7. The Director of Agriculture, Kerala.
8. Shri Abdus Shokur.
9. Shri Jagannath Misra.
10. Shri V. J. Joseph.
11. Shri K. A. Keraleeyan.
12. Mr. A. B. Argo.
13. Shri A. R. Sulaiman Sait.
14. Shri B. M. Peter.
15. Shri S. C. Balakrishnan.
16. Shri P. T. John.
17. The Co-operative Marketing Officer, Indian Central Arecanut Committee (Co-opted).



18. The Director of Agriculture, Andhra Pradesh (Co-opted).
19. The Registrar of Co-operative Societies, Kerala (Co-opted).
20. The Secretary.

**V. Technological Sub-Committee.**

1. Dr. V. Subrahmanyam (Co-opted) - Chairman.
2. The President.
3. The Vice-President.
4. Shri P. T. John.
5. Shri P. B. Kurup.
6. Shri C. M. John.
7. Mr. A. B. Argo.
8. Shri K. P. Amrithanatha Iyer.
9. Shri T. Bhaskara Rao.
10. Dr. K. S. Murti, Principal, Oil Technological Institute, Anantapur (Co-opted).
11. The Oil Technologist, Kerala Soap Institute, Kozhikode (Co-opted).
12. The Officer in charge, Oil Technological Work, Kerala University, Trivandrum (Co-opted).
13. The Secretary.

**VI. Scientific Appointments Sub-Committee.**

1. The President-Chairman.
2. The Vice-President.
3. Shri P. B. Kurup.
4. The Agricultural Commissioner with the Government of India.
5. The Secretary.

**VII. Extension Sub-Committee.**

1. Dr. S. M. Sikka-Chairman.
2. Director of Agriculture, Kerala or his representative.
3. do. Mysore do.
4. do. Madras do.
5. do. Andhra do.
6. do. Bombay do.

7. Director of Agriculture, West Bengal or his representative.
8. do. Orissa do.
9. do. Assam do.
10. do. Pondicherry do.
11. Shri K. P. Amrithanatha Iyer.
12. Shri B. M. Peter.
13. Shri K. A. Keraleeyan.
14. Shri A. C. Sankaranarayanan.
15. Shri R. Srinivasa Iyer.
16. Shri N. Badrudeen.
17. Shri C. H. Lingadevaru.
18. Shri S. R. Sabariperumal Pillai.
19. Shri Alluri Sathyanarayana Raju.
20. Shri A. T. Patil.
21. Shri Abdus Shokur.
22. The Director, Central Coconut Research Station, Kayangulam.
23. The Joint Director, Central Coconut Research Station, Kasaragod.
24. Shri K. P. Madhavan Nair.
25. Shri S. C. Balakrishnan.
26. Shri V. Eacharan.
27. Shri T. Bhaskara Rao.
28. Shri Jagannath Misra.
29. The Secretary.

*Subject No. 6.* Proceedings of the Meeting of the Finance Sub-Committee held on 22-9-1958.

The Committee took note of the decisions taken by the Finance Sub-Committee at its meeting held on 22-9-1958.

*Subject No. 6-A.* Action taken on the suggestions made by the President in his addresses to the 23rd, 24th and 25th meetings of the Committee.



Shri Sabariperumal Pillai pointed out that there were certain errors in the Tamil edition of the handbook on "Coconut Cultivation".

The President requested Mr. Pillai to send a corrected copy of the book to the Secretary who would arrange to incorporate the corrections in a revised edition of the book.

On a suggestion made by Shri C. M. John, the President directed that 200 copies of the English edition of the handbook on "Coconut Cultivation" and 500 copies of the concerned language edition should be sent to the Directors of Agriculture of the coconut-growing States for sale.

The Committee agreed to another suggestion by Shri C. M. John that the film on "Growing Coconuts" be screened at all future meetings of the Committee.

**Decisions on subjects coming within the purview of the Agricultural Research and Development Sub-Committee (Research Wing).**

*Subject No. 7.* Action taken on the decisions of the 25th Meeting regarding subjects coming within the purview of the Agricultural Research and Development Sub-Committee (Research Wing).

The Sub-Committee had recommended that in view of the serious damage done by the rhinoceros beetle, a drive should be undertaken in the affected areas to apply the control measures which had been found useful, such as treatment with BHC of all manure and compost heaps and a Special Sub-Committee consisting of the following persons had been set up to draw up a few definite recommendations which could be brought to the notice of the Agricultural Departments of the States with a view to mounting a vigorous campaign for the enforcement of plant protection measures:—

1. Shri C. M. John.
2. Dr. E. S. Narayanan.
3. Shri S. G. Aiyadurai.
4. Shri R. Srinivasa Iyer.

5. Dr. K. P. V. Menon.

6. Shri P. M. Kochappa Menon.

The Sub-Committee had also suggested that the Secretary, Indian Central Coconut Committee should obtain from the South Pacific Commission any literature or papers they may have issued regarding the control of coconut pests; especially the rhinoceros beetle.

The Committee considered the report of the Special Sub-Committee mentioned above (*Vide* Appendix I) and accepted its recommendations.

The Committee also accepted the Sub-Committee's suggestion that literature on the control of the rhinoceros beetle be obtained from the South Pacific Commission.

*Subject No. 8.* Working Paper on Coconut Research under the III, IV & V Five-Year Plans.

At the Sub-Committee meeting, the Chairman, Dr. Sikka had explained the background against which the working paper had been prepared. He had also clarified the latest position regarding the preparation of working papers for the Planning Commission. There was considerable discussion and attention had been drawn to a number of subjects which required special consideration such as the need for a more planned and comprehensive programme of plant protection. It had also been pointed out that there was need for research on the irrigation and inter-cultural aspects, and that it was now time to think of introducing suitable machinery adopted for use on small holdings, such as a small type of tractor which might be useful for carrying out various operations in coconut gardens. Sprinkler irrigation, it had been indicated, had distinct possibilities, especially in sandy areas.

In view of the importance of the subject, the Sub-Committee had felt that it was necessary to give further detailed consideration to the matter, and had set up a special Sub-Committee consisting of the following to prepare a suitable note:—

1. Dr. S. M. Sikka.

2. Shri C. M. John.

3. Dr. K. P. V. Menon.



4. Dr. K. M. Pandalai.
5. Shri P. D. Nair.
6. Shri T. Gopalan Nair.
7. Shri S. G. Aiyadurai.

The Special Sub-Committee's report (*Vide* Appendix II) was considered by the Committee and accepted by it.

The Committee also accepted a suggestion made by Shri C. R. Seshadri that the production of hybrid seedlings could be undertaken in those regional research stations in which there are trained workers.

*Subject No. 9.*     *Ad hoc* Sub-Committee to consider the question of extension of results of research - nomination of growers' representatives by President - ratification of.

The Committee accepted the Sub-Committee's recommendation that the nomination of Sarvashri A. C. Sankaranarayanan and S. R. Sabariperumal Pillai on the Standing Committee set up to deal with the question of explaining to the coconut growers the results of research work done at the Central Coconut Research Stations, be ratified.

*Subject No. 10.*     Nomination of a member of the Indian Central Coconut Committee on the Council of Scientific and Industrial Research.

The Sub-Committee had recommended that this item might be considered directly by the Full Committee. Accordingly the Full Committee considered it and elected Shri P. B. Kurup to represent the Committee on the Council of Scientific and Industrial Research.

*Subject No. 11.*     Annual or Biennial Conferences of Coconut Research Workers.

The Sub-Committee was of the opinion that an annual conference of coconut research workers would be of great benefit and that to this conference workers on the extension side might also be invited. As it was considered that it would be useful if the conference were held at a place where active research on problems

relating to the coconut was in progress, the Sub-Committee had recommended that the first Conference might be held at Kayangulam or Quilon within the next five or six months and that thereafter the conference could be so arranged as immediately to precede or follow the Annual Meeting of the Indian Central Coconut Committee.

The Committee accepted the above recommendations.

*Subject No. 12.* Progress Report on the Central Coconut Research Station, Kayangulam, for the year ended 30-6-1958.

In the Sub-Committee meeting, in reply to the Chairman, Dr. K. P. V. Menon, Director, Central Coconut Research Station, Kayangulam had stated that some of the recommendations of the Expert Reviewing Committee were already being implemented while others would be taken up during the current year. The Sub-Committee had recommended that the annual progress report of the Central Coconut Research Station, Kayangulam should be printed and made available to the members of the Indian Central Coconut Committee and that some copies should be made available to the research workers at the regional stations.

The Sub-Committee had also recommended that the results showing the benefit of a combined programme of manuring and spraying in minimising the effect of coconut diseases should be brought to the notice of growers immediately.

It had been pointed out that the figures reported in table 2 of the progress report required to be checked up.

Subject to these remarks the Sub-Committee had recommended the adoption of the report as a record of satisfactory work.

The full Committee accepted the recommendations of the Sub-Committee.

*Subject No. 13.* Progress Report on the Central Coconut Research Station, Kasaragod for the year ended 30-6-1958.



As in the case of the report of the Kayangulam Station, the Sub-Committee had recommended that the report of the Central Coconut Research Station, Kasaragod, should be printed and made available to the members of the Committee and also to research workers dealing with the coconut.

In the Sub-Committee meeting in reply to a question from Shri Madhavan Nair, Dr. Pandalai had said that while there was no correlation between the yield of nuts and the colour of coconut leaves, there was definite correlation between the number of leaves and the number of fruit primordia. In reply to a further question, Dr. Pandalai had stated that the correlation between the leaf area of a coconut palm and the nut yield had not yet been determined. The Sub-Committee had thereupon recommended that such a study should be undertaken.

With regard to the figures given under the headings "Study of Seedlings", "Study of Indigenous Varieties" and "Trial of New Varieties", it had been mentioned that the number of plants on which the summary was based should be stated. It had also been mentioned that the figures regarding the results of the higher and lower doses of fertilisers, required to be cheked up and explained, as well as the statement regarding the relation between the quality of the nut and the application of fertilizers.

It had been recommended that in view of the planting of exotic varieties, the West Coast Tall should be planted as a control for comparison, this being now a standard variety for the area. It had been mentioned under "Botany and Breeding" in the report that a large number of nuts received from abroad had failed to sprout or had been damaged. It had, therefore, been suggested that steps should be taken to try and ensure better arrangements for the transport of nuts for experimental purposes.

Subject to these remarks, the report had been recommended for adoption as a record of satisfactory work.

The Committee accepted the recommendations of the Sub-Committee.

*Subject No. 14.* Central Coconut Research Station, Kasaragod-Observations of Prof. J. B. S. Haldane on the work of.

At the Sub-Committee meeting the Chairman had suggested that the Sub-Committee should only consider, objectively, the suggestions which had been made by Prof. Haldane. Since coconut breeding was a very long-range work, it was very necessary to plan the work in accordance with genetical principles as thoroughly as possible. The recommendations made by the Ramiah Committee and by Prof. Haldane should be taken into account as well as the considerable data which had become available at the Central Coconut Research Station, Kasaragod. The following Sub-Committee was recommended to be set up to go into the subject very thoroughly and to draw up a detailed long-range programme for the genetical and breeding work to be carried out at the Central Coconut Research Station:-

1. Dr. S. M. Sikka (Chairman).
2. Shri C. M. John.
3. Dr. M. S. Swaminathan.
4. Dr. V. G. Panse.
5. Dr. K. C. Naik.

It was also recommended that the paper entitled "Suggestions for research on coconuts" submitted by Prof. Haldane be published in "The Indian Coconut Journal". This article gave Prof. Haldane's personal suggestions and he himself had stated that all the suggestions may not be practicable. However, the suggestions were interesting and were likely to stimulate coconut research workers to work on new lines.

The Committee accepted the Sub-Committee's recommendations and decided that the Special Sub-Committee should meet within a period of four months.

*Subject No. 15.* Regional Coconut Research Stations in Kerala State-Review of work done at.

The Sub-Committee after considering the useful report submitted by Shri C. M. John and Dr. K. M.



Pandalai had recommended that it be forwarded to the State Government for necessary action and that in the matter of the future set up of the Regional Stations referred to in para (1) under "General remarks", a Special Sub-Committee, consisting of Mr. C. M. John, Dr. K. M. Pandalai and Shri T. Gopalan Nair, Joint Director of Agriculture (Research), Department of Agriculture, Kerala State, be set up to review the position and make recommendations.

The Sub-Committee had also recommended that the sanction accorded by the President for closing down the Regional Coconut Research Station at Thodupuzha be ratified and that the two Regional Coconut Research Stations at Neyyattinkara and Kumarakom be extended for a period of three years from 22-12-1959 on the usual basis of sharing expenditure.

The Committee accepted the Sub-Committee's recommendations.

*Subject No. 16.* Progress Report on the Regional Coconut Research Stations Scheme in Kerala State, for the year ended 30-6-1958.

The Sub-Committee's recommendation that the report be adopted was accepted by the Committee.

*Subject No. 17.* Progress Report on the Scheme for the establishment of a Regional Coconut Research Station in Mysore State for the year ended 30-6-1958.

The Committee accepted the Sub-Committee's recommendations (1) that breeding work on coconuts be omitted from the programme of work as it required facilities not available at the Regional Research Station; (2) that a more detailed technical programme be drawn up and (3) that in accordance with an earlier recommendation of the Indian Central Coconut Committee the staff for the Regional Station be trained at Kasaragod.

The Committee took note of the Mysore Government's representative's statement that it was proposed to send soon the concerned staff for training to Kasaragod.

*Subject No. 18.* Progress Report on the Scheme for the Establishment of a Regional Coconut Research Station in Madras State for the year ended 30-6-1958.

The Sub-Committee had noted that four hundred and twelve seed coconuts of nine exotic varieties and hybrid nuts of Tall X Dwarf had been sown in the coconut nursery at Pattukottai and had recommended that suitable numbers of exotic varieties and hybrid coconuts should be made available from the Central Coconut Research Station to all the regional stations and that the latter should be asked to indicate the dates by which they would be ready to receive material for planting. The Sub-Committee had also recommended the report for adoption.

The Sub-Committee's recommendations were accepted by the Committee.

*Subject No. 19.* Progress Report on the Regional Coconut Research Station Scheme in Andhra Pradesh for the year ended 30-6-1958.

The Sub-Committee had desired that the result reported regarding the non-effectiveness of the application of equal parts of sand and 5% BHC on the incidence of rhinoceros beetle should be looked into by the State Entomologist.

It had also desired that more information should be given about the variety "Gangabondam" *vis-a-vis* other varieties being grown in the area.

With regard to the inter-crops mentioned in the report, the Sub-Committee had desired that information should be given as to the effect of these crops on the coconut crop etc. and also what manure was being given to these crops.

Referring to the intercropping trial, the Sub-Committee had suggested that the cost of cultivation per acre might also be given.

With reference to the green manuring trial, it had suggested that the growing of *Glyricidia* on the boundaries of the fields might also be tried.



Subject to these remarks the report had been recommended for adoption.

The Committee adopted the Sub-Committee's recommendations and suggestions.

*Subject No. 20.* Progress Report on the Regional Coconut Research Station, Bombay State for the year ended 30-6-1958.

The Committee adopted the report as recommended by the Sub-Committee.

*Subject No. 21.* Progress Report on the Regional Coconut Research Station, Sakhigopal, Orissa State for the year ended 30-6-1958.

The Committee noted that the full report had not been received.

*Subject No. 21A.* Proposal for up-grading the post of Coconut Research and Development Officer, Orissa.

The Committee accepted the Sub-Committee's recommendations (1) that the post of Coconut Research and Development Officer be upgraded from Class II to Class I and (2) that the expenditure be shared equally by the Indian Central Coconut Committee, the Indian Central Arecanut Committee and the State Government, on the understanding that the State Government would appoint the existing incumbent to the upgraded post in order to make use of his special experience in work on this crop.

*Subject No. 22.* Progress Report on the Scheme for the Investigation of the "Band" Disease of the Coconut Palm in Bombay State for the year ended 30-6-1958.

The Sub-Committee's recommendation that the report be adopted was accepted by the Committee.

*Subject No. 23.* Scheme for the Investigation of the "Band" Disease of the Coconut palm in Bombay State — Report of the Plant Physiologist, Central Coconut Research Station, Kayangulam on.

The Sub-Committee had noted the recommendations of the Plant Physiologist, Central Coconut Research

Station, Kayangulam, on the working of the scheme and recommended that as the Indian Central Arecanut Committee had appointed a small Expert Committee to report on what should be the future work on "Band" disease on arecanuts at the Poona Centre and since there was a suggestion that the disease on the two palms may be the same, the same Team (on which the Indian Central Coconut Committee was already represented) might be asked to make recommendations in respect of the disease of coconuts also. Since the present scheme was due to terminate on 14-1-1960 it was recommended by the Sub-Committee that the report of the Expert Committee might be obtained early and placed before a joint meeting of the Agricultural Research Sub-Committees of the Indian Central Coconut Committee and the Indian Central Arecanut Committee and that a special early meeting of these two Sub-Committees might be arranged for the purpose.

The Committee accepted the recommendation.

*Subject No. 26.* Scheme for the Survey of Coconut Pests and Diseases in West Bengal.

The Committee accepted the Sub-Committee's recommendation that since the present scheme was not in the proper form the Government of West Bengal be requested to prepare the scheme in the proper form and re-submit it, for being financed on the usual basis,

### GENERAL

The Sub-Committee's attention had been drawn to the fact that in some cases annual reports had been received very late or not at all. In several cases the name of the officer supervising the Scheme and also the date of submission of the report had not been given. The Sub-Committee had, therefore, wished to draw attention to the need for some action to ensure that reports in proper form from these States on Schemes which were being worked under their control were received in time by the Secretary, Indian Central Coconut Committee, to enable proper assessment of the progress of work to be made.



The Committee accepted the Sub-Committee's suggestion.

**Decisions on Subjects coming within the Purview  
of the Agricultural Research and Development  
Sub-Committee (Development Wing).**

*Subject No- 27.* Action taken on the decisions of the 25th meeting of the Committee on subjects coming within the purview of the Agricultural Research and Development Sub-Committee (Development Wing).

The Sub-Committee had recommended that Secretary's note be approved with the following observations:-

*Subject No. 32.* The Sub-Committee recommended that the Governments of Mysore, Pondicherry, Kerala and Andhra Pradesh might be requested to extend the facility of loans for digging wells and purchase of pumping sets on easy instalments to the coconut growers also.

*Subject No. 33-A.* It was recommended that more emphasis should be laid on filling of gaps in existing coconut gardens than on the removal of un-economic trees, against which there were local prejudices.

*Subject No. 34.* It was felt that more concrete steps were required to prevent the transport of coconut seedlings from the diseased to healthy areas in order to check the further spread of coconut diseases. The possibility of cordoning off of heavily diseased areas by enacting suitable legislation needed to be examined in this connection.

*Subject No. 39-A.* The State Government of Kerala might be requested again to exempt coconut gardens from land ceiling, as was reported to have been done in

the case of arecanut and coconut plantations in Mysore.

The Sub-Committee's recommendation was accepted by the Committee.

*Subject No. 28.* Increasing the production of coconut seedlings - Proceedings of the Special Sub-Committee for.

The Sub-Committee had recommended that the report of the Special Sub-Committee be approved with the following observations:-

- i) The booklet containing instructions regarding selection of gardens for marking mother palms, selection of mother palms etc. prepared by the Joint Director, Central Coconut Research Station, Kasaragod, should be printed and distributed to all the concerned States latest by 28th February, 1959.
- ii) The note dealing with the various aspects of underplanting and new planting should also be printed and distributed to the coconut growing States latest by the end of February, 1959.
- iii) Twenty National Extension Service nurseries should be sanctioned for each of the States of West Bengal and Assam on the model of similar nurseries sanctioned for the Kerala State.
- iv) The Governments of all the coconut growing States should be requested to forward proposals for producing additional number of seedlings to meet the requirements of underplanting and new planting.

Dr. Barooah, Joint Director of Agriculture, Assam pointed out that the Assam State's annual plan had already been finalized and that it would not be possible to make any provision in the State budget to start nurseries in National Extension Service Blocks. He, therefore, suggested that the Committee may advance the cost of seednuts and contingencies and take all the receipts from the sale of seedlings.



- v) The Central Coconut Research Station, Kasaragod, might be allowed to concentrate on the supply of quality seednuts instead of setting up a sub-nursery at Kasaragod. The Station should make efforts to supply four to five lakhs seednuts annually to the States in accordance with their demand.
- vi) As provision of irrigation facilities in the coconut nurseries is very essential for fulfilling the targets fixed for the supply of seedlings, it was recommended that the Indian Central Coconut Committee might relax the rules governing the grants made by the Committee by allowing 50 per cent of the non-recurring cost on digging of wells or the purchase of pumping sets to be met by the Committee. It was also recommended that the State Governments might be requested to forward schemes for the provision of irrigation facilities in coconut nurseries at an early date in accordance with this new pattern of financial assistance.

The President, however, suggested that the same principle as was adopted in the case of Kerala should be adopted in the case of Assam and West Bengal also and that the production target for each nursery might, if necessary, be reduced to limit the loss to be reimbursed by the Committee to the amount sanctioned for each National Extension Service Block nursery in Kerala.

The recommendations of the Sub-Committee and the above suggestion of the President were accepted by the Committee.

*Subject No. 29.* Working Paper on Coconut Development under the Third, Fourth & Fifth Five-Year Plans.

The Sub-Committee had approved of the short and long-term measures included in the Working Paper for the development of coconut during the Third, Fourth and Fifth Plans. It had, however, been pointed out that the fertilisers to be made available to the coconut growers need not necessarily be ammonium sulphate and

superphosphate. The soils on which coconuts were growing were mostly acidic in reaction and, therefore, supply of such fertilizers as were suitable for application to acidic soils would have to be arranged. So far as phosphatic fertilizers were concerned, bone-meal was considered to be more useful for acidic soils than superphosphate.

It has also been pointed out that the figures of acreage given in the Working Paper for new plantings of coconut were low in most cases. A detailed survey was thought necessary in all the coconut growing States to arrive at the correct figures.

The Working Paper had been recommended for forwardal to the Government of India with the above observations.

While accepting the recommendation of the Sub-Committee, the Committee also decided that all development schemes should be submitted through the Committee who will arrange for their scrutiny and that funds for financing the schemes should be placed at the disposal of the Committee.

The Committee also decided that provision should be made for a larger number of parasite breeding stations.

*Subject No. 30.* Central Supervisory Body for the implementation of coconut scheme under the Second Plan-proceedings of the third and fourth meetings.

The Vice-President of the Committee had explained to the Sub-Committee the salient points of the report and it had been agreed that the State Governments be requested to depute the Directors of Agriculture themselves to attend the future meetings of the Supervisory Body so that the object for which the Supervisory Body had been set up could be fulfilled. It had also been recommended that only two meetings of the Supervisory Body need be held in a year, in future, as the Directors of Agriculture might not find it possible to attend more frequent meetings. For making the Progress Reports on coconut schemes, sanctioned under the Second Five-Year



Plan, more comprehensive, it had been recommended that a suitable proforma should be drawn up by the Secretariat of the Committee and supplied to the State Governments.

The recommendations were accepted by the Committee.

*Subject No. 31.* Coconut Nursery Scheme, Ollukara, Kerala State - extension proposal.

The Committee adopted the Sub-Committee's recommendations (1) that the scheme be extended for a period of five years from 1st April, 1959, to 31st March, 1964 at a net expenditure of Rs. 6,541; (2) that the target for the distribution of seedlings be fixed at 10,000 per annum instead of 7,500 mentioned in the extension proposal.

*Subject No. 32.* Progress Report on Coconut Nursery Schemes in Kerala State for the year ended 30-6-1958.

Subject to the observation that 1,31,177 seedlings had been distributed during the year against the target of 1,54,700 the report was adopted.

*Subject No. 33.* Progress Report on the Coconut Nursery at Kumta (Mysore State) for the year ended 30-6-1958.

It was noted that the Director of Agriculture, Mysore, had prepared a revised coconut nursery scheme according to which it was proposed to raise 90,000 seedlings annually from seven nurseries (including the nursery at Kumta) under the Second Five-Year Plan and the report was adopted.

*Subject No. 34.* Final Report on the Comprehensive Scheme for the Establishment of Coconut Nurseries in Madras State.

The Report was approved as recommended by the Sub-Committee.

*Subject No. 35.* Progress Report on the Comprehensive Coconut Nursery Scheme in Andhra Pradesh for the year ended 30-6-1958.

The work done under the scheme was considered to be satisfactory and the report was adopted.

*Subject No. 36.* Progress Report on the Comprehensive Coconut Nursery Scheme in Orissa for the year ended 30-6-1958.

The Committee noted that since the progress report had not been received, it could not be considered. It also noted the explanation of the Coconut Development Officer of Orissa State, that the progress report relating to the scheme had since been submitted to Orissa Government and that the target for distribution of coconut seedlings had been exceeded.

*Subject No. 37.* Progress Report on the Coconut Nursery Scheme in West Bengal for the year ended 30-6-1958.

As recommended by the Sub-Committee the Committee adopted the report subject to the remarks that 17,865 seedlings from the nursery at Chandernagore and 2,669 seedlings from the nursery at Cooch Behar had been distributed during the year against the targets of 24,000 and 4,000 respectively; and (2) that the required statement showing the number of seed nuts collected, number sown, number germinated, and number of seedlings distributed had not been attached to the progress report.

*Subject No. 38.* Scheme for the Establishment of a Coconut Nursery in the northern part of West Bengal - extension of.

The Sub-Committee's recommendation that the scheme be extended from 20th October, 1959, to 31st March, 1961, so as to make it co-terminus with the Second Five-Year Plan period, was accepted by the Committee.

*Subject No. 39.* Progress Report on the Scheme for the Establishment of a Parasite Breeding station for the biological control of the *Nephantis serinopa* in Kerala for the year ended 30-6-1958.

*Subject No. 40.* Parasite Breeding Stations in Kerala State-Review of work of.

The above subjects had been considered by the Sub-Committee together and the following recommendations had been made:-



- i) A new station for breeding of parasites of *Nephantis* should be set up at Trichur, in addition to the existing six stations.
- ii) All the seven stations should continue to be controlled by the State Government of Kerala; but, there should be close collaboration with the Central Coconut Research Station at Kayangulam.
- iii) The staff for each of the stations should consist of one Field Assistant (Matriculate) and two laboratory attendants. In addition, one Assistant Entomologist should be appointed for assisting the Entomologist of Kerala State in looking after the work of the parasite breeding stations.
- iv) Dr. Kurian and Shri Antony should be sent to the Division of Entomology, Indian Agricultural Research Institute for training for three months to study the general principles of parasiticism and biological control and the technique of mass breeding of the parasite.
- v) Work on fundamental aspects relating to different parasites of *Nephantis* should be carried out at the Central Coconut Research Station, Kayangulam, as recommended in Dr. Narayanan's report. The Assistant Entomologist to be recruited in the scheme should, however, make a survey of the pest population and the reduction in this population as a result of parasite liberations, so that a clear graphical picture of the periodic rise or fall in the pest population could be obtained.

The Committee accepted the recommendations with the modification that Shri Antony be deputed for training to the Commonwealth Biological Control Institute at Bangalore instead of Delhi.

*Subject No. 41.* Scheme for the Establishment of a Zonal Parasite Breeding Station for the biological control of *Nephantis seri-nopa* at Razole, Andhra Pradesh - proposal for the extension of.

The Committee accepted the Sub-Committee's recommendation that the scheme be extended from 1st September, 1956, to 31st March, 1958, on the usual financial pattern.

*Subject No. 42.* Progress Report on the Scheme for Establishment of Parasite Breeding Stations for the Biological Control of *Nephantis serinopa* in Andhra Pradesh for the year ended 30-6-1958.

The Committee accepted the Sub-Committee's recommendation that the work done under this scheme was satisfactory and that the progress report might be adopted.

*Subject No. 43.* Progress Report on the Scheme for the Maintenance of the Collection Block of Representative Varieties of Coconuts in Assam for the year ended 30-6-1958.

The progress report was approved as recommended by the Sub-Committee.

*Subject No. 44.* Organisation of Coconut Crop Competition in Kerala State.

The Sub-Committee had been of the view that it would be useful to organise competitions in coconuts on the basis of the number of high-yielding "mother" palms in individual holdings and it had been recommended that the scheme be recast by the State Government for this purpose.

The Sub-Committee's recommendation was accepted by the Committee.

*Subject No. 45.* Removal of Uneconomic Trees and Planting Quality Seedlings in their stead—Suggestion from Shri P. B. Kurup.

As various State Governments had already been addressed on the subject and necessary action was being taken by them, it had been felt by the Sub-Committee that the proposal need not be pursued further at this stage.



The Committee endorsed the Sub-Committee's view.  
*Subject No. 46.* Coconut Nursery Officers' Conference-Holding of.

The Committee accepted the Secretary's recommendation that a conference of the Coconut Nursery Officers should be convened within the next five or six months at Kasaragod or Mangalore.

*Subject No. 24.* Coconut Fertiliser Demonstration Scheme in West Coast by Messrs. Potascheme and Parry and Company, Limited—Consideration of the methods for popularising the results of the scheme.

The Sub-Committee was of the view that the results presented in the report were very useful and had recommended that the main findings of the Fertiliser Demonstration Scheme should be passed on to the Directors of Agriculture, Coconut Development Officers of different States and the Extension staff in Community Development Blocks, so that maximum use is made of the results in increasing production of coconuts. It had also felt that concrete steps should be taken for popularising the use of fertilisers for manuring of coconut palms and to this end had made the following recommendations:—

- i) The Government of India might be requested to allot special quota of nitrogenous, phosphatic and potassic fertilizers for the coconut crop to firms who have indicated their willingness to prepare manure mixtures.
- ii) The manure mixtures should be supplied to the coconut growers at reasonable rates to be fixed in consultation with the Directors of Agriculture of the coconut growing States.
- iii) In case of small coconut growers having an area of five acres or less, the fertilizer mixtures should be supplied on loan in kind. The recovery of the cost of the fertilizer should be made in the fourth year when the coconut plants are expected to show full response to the application of fertilizers.

The Committee accepted the recommendations of the Sub-Committee.

*Subject No. 25.* Coconut Fertilizer Demonstration Scheme - Proposal for the Indian Central Coconut Committee to take over certain demonstration fields.

The Committee accepted the Sub-Committee's recommendation that the 12 plots selected by the Director, Central Coconut Research Station, Kayangulam be taken over and that the fertilizer demonstrations thereon be continued for a period of five years from the date of termination of the present scheme at a total cost of Rs. 12,500 to be met by the Indian Central Coconut Committee.

### GENERAL

The Committee accepted the Sub-Committee's recommendation that in view of the extensive developmental work on coconut which had already been taken up or was proposed to be taken up in a number of States, a post of Chief Coconut Development Officer be created for over-all co-ordination of the work, in the scale of Rs. 1,000-50-1,400 and the expenditure thereon be met by the Indian Central Coconut Committee.

### Decisions on Subjects coming within the Purview of the Extension Sub-Committee

*Subject No. 47.* Extension of results of research work done at the Central Coconut Research Stations to coconut growers.

The results of research arising out of the work done at the Central Coconut Research Stations at Kayangulam and Kasaragod as presented in the secretariat note were examined and discussed by the Sub-Committee and it was recommended that the following action might be taken:

#### 1. *Rhinoceros beetle.*

This is a very major and universal pest of coconuts. A campaign to control this pest in the breeding places is



to be started in the N. E. S. and Community Development Blocks in the first instance. The provisions of the Pest Act may have to be enforced. Film shows, demonstration and distribution of leaflets are to be arranged so that people may be educated before the Pest Act is enforced.

Every manure pit or heap of decomposing organic matter will be treated with BHC once every 2 months in the areas where the Pest Act is declared. The Agricultural Extension Officers will be the inspecting officers under the Act. The assistance of Gram Sevaks, Local village organisations, the Farmers' Forum, Panchayats, Municipalities etc. may be invoked for implementing the scheme in every village.

Hooking out the beetle using beetle hooks and the application of BHC and sand in the crowns are also to be popularised for implementation through the same agency.

#### 2. *Nephantis serinopa*.

It is recommended that more parasite breeding stations be started on the East Coast for the mass multiplication and liberation of parasites as is done in the Kerala State.

#### 3. *Rhynchophorus ferrugineus* (Red Palm Weevil).

More propaganda appears to be necessary for popularising the efficacy of Pyrocone E against the weevil. Coloured posters, demonstrating the pests and its control may be printed and distributed in large numbers. Pyrocone E and injection funnels should be made available.

#### 4. *Diseases*.

In the areas where the spraying scheme is in progress the importance of manuring and spraying has to be stressed because spraying would be most effective when adequate manuring is also done. Measures may be taken for providing loans in kind to cultivators.

#### 5. *Hybrid and exotic varieties of palms*.

As far as possible it is suggested that hybrids and

exotic varieties should be planted in the Regional Research Stations where new planting is resorted to and in nurseries where new planting is to be taken up.

6. Extensive demonstration of the benefit of cultural and manurial operations should be made in demonstration plots in different parts of the country. Provision of loan of fertilisers may be made to all the coconut growing regions.

7. As green manure to increase the organic matter content of the soil the planting of *Glyricidia* along the borders of the coconut farms should be popularised to the fullest extent.

The Committee accepted the recommendations of the Sub-Committee with the modification that planting of hybrids in nurseries will not serve any useful purpose as the nuts produced by hybrid palms could not be utilised for further planting.

The Committee approved of the President's suggestion that the State Governments concerned be requested to submit for the Committee's consideration at its next meeting proposals for producing on a large scale hybrid seedlings at the Regional Coconut Research Stations.

The Committee also approved of Shri S. R. Sabariperumal Pillai's suggestion that the advantages of Mason's mixture and castor oil refuse in controlling the rhinoceros beetle be investigated.

### **Decisions on subjects coming within the purview of the Marketing and Economics Sub-Committee**

*Subject No. 48.* Action taken on the decisions of the 25th Meeting of the Committee on subjects coming within the purview of the Marketing and Economics Sub-Committee.

The Sub-Committee had while noting the action taken on the decisions taken at the last meeting of the Committee, recommended:—



(1) that the Government of India be requested once again to address the Railway Board to classify coconuts containing water as “perishable” as they are in fact perishable and much spoilage takes place in transit;

(2) that the Secretary of the Committee might remind the Kerala Government regarding the speedy enactment of necessary legislation for the extension of the “Madras Commercial Crops Markets Act” to the Travancore-Cochin area.

The Committee accepted the above recommendations.

*Subject No. 49.* Progress Report on Schemes for the Correct Estimation of Area and Yield Statistics of Coconuts and Arecanuts under the II Five Year-Plan.

The Committee accepted the Sub-Committee’s recommendations:—

(1) that the progress report be recorded;

(2) that the revised scales of pay suggested for the staff in the scheme for Kerala be approved; and

(3) that the proposal for giving a higher start of Rs. 100 in the scale of Rs. 80-5-100-8-140-EB-10-200 to two Junior Statistical Assistants in the scheme for Bombay be approved.

The Committee also accepted the Sub-Committee’s recommendation made on the suggestion of Shri. R. Srinivasa Iyer, that the Government of Madras be addressed to have a complete census of coconut palms in the coconut growing districts of the State undertaken by the village revenue staff.

*Subject No. 50.* Scheme for the Organisation of Three Co-operative Coconut Marketing Societies in Andhra Pradesh.

The Committee adopted the Sub-Committee’s recommendations (1) that the scheme be approved and an expenditure of Rs. 9,434.25 for one year from 1-2-1959 be met by the Committee, and (2) that the Committee agree to meet an expenditure of Rs. 11,206.63 on the extension of the Scheme from 1-2-1960 to 31-3-1961 in the

the State Government also extended financial aid to the Societies for the above period.

### **Decisions on Subjects coming within the Purview of the Technological Sub-Committee**

In the Sub-Committee meeting the Chairman had pointed out that considerable delay occurred before financial sanction was obtained from the Government of India and pleaded for some measures to be taken to expedite the financial sanction, once schemes had been approved and recommended by the Technological Sub-Committee.

*Subject No. 51.* Action taken on the decisions of the 25th Meeting of the Indian Central Coconut Committee regarding subjects coming within the purview of the Technological Sub-Committee.

The Sub-Committee had noted the action taken on items 1, 2, 3, 8 and 12 in the Secretariat note.

*Item 4.* The Sub-Committee had recommended that as tender coconut was not a surplus commodity and it was available throughout the year, its preservation by cold storage was unnecessary and that no action need be taken on the subject.

*Item 5.* The Sub-Committee had recommended that no action need be taken on it as it did not offer much practical possibilities.

*Item 6.* Dr. K. M. Pandalai, Joint Director, Central Coconut Research Station, Kasaragod had stated that it would not be possible for him to take up the work with the present staff and facilities. Views had been expressed by various members that further research was not necessary for evolving a simple method of refining which could be adopted by small producers. It was, therefore, recommended that no action need be taken on this subject.

*Item 9.* It had been recommended that no further action need be taken on this subject, in view of the conclusions arrived at by the Ceylon Coconut Research



Institute that the manufacture of potassic manures from coconut husk, petiole etc., was not an economic proposition.

*Item 10.* There had been considerable discussion on this subject and it had been pointed out that the cost of chemical treatment of the coconut leaves should be commensurate with the increase in the life of the treated leaves. It had been felt that the subject was of general interest and offered practical application. The Joint Director, Central Coconut Research Station, Kasaragod had informed the Sub-Committee that studies had already been undertaken at his Station. The Sub-Committee had, therefore, recommended that the work might continue.

*Item 11.* It had been noted that the Joint Director, Central Coconut Research Station, Kasaragod was making arrangements to send some samples of shed buttons to the Central Leather Research Institute, Madras.

*Item 13.* After some lively discussion, the need for conducting further work to improve the efficiency of chekkus (ghanni) and the rotaries for the extraction of coconut oil from copra was appreciated and the Principal, Oil Technological Institute, Anantapur was requested to submit a scheme for consideration at the next meeting of the Technological Sub-Committee.

*Item 15.* The Sub-Committee had noted the action already taken as reported by the Secretary, and had accepted Shri K. P. Madhavan Nair's suggestion that information already communicated to Shri K.P. Amrithanatha Iyer might be communicated to others also who might be interested in the subject.

The Committee accepted the Sub-Committee's recommendations.

*Subject No. 52.* Scheme for Separation of Lauric acid from Coconut Oil.

Dr. K. S. Murti had informed the Sub-Committee that in another scheme sponsored by the Joint Committee of the Council of Scientific and Industrial Research and the Indian Central Oilseeds Committee he had taken up

a project which involved the separation of lauric acid from coconut oil. Mr. P. T. John, Tata Oil Mills, Ernakulam had informed the Committee that they were setting up a plant for the splitting and fractionating of fatty acids. In view of the fact that some work was in progress at Anantapur and that the industry was also installing plants, the Sub-Committee had recommended that the Scheme submitted by the Regional Research Laboratory, Hyderabad need not be approved.

The Committee approved of the Sub-Committee's recommendation.

*Subject No. 53.* Offer of the Director, Nutrition Research Laboratory, International Commission for Prevention of Alcoholism, Bombay for undertaking coconut technological work.

The Committee accepted the Sub-Committee's recommendation that as the programme of work submitted by the Nutrition Research Laboratory was practically on the same lines as those on which the Committee had already sanctioned a scheme of work to be undertaken at the Central Food Technological Research Institute, Mysore, it was not necessary to accept the offer of the Director of the Nutrition Research Laboratory, International Commission for Prevention of Alcoholism.

#### **Decisions on subjects coming within the purview of the Finance Sub-Committee**

*Subject No. 54.* Action taken on the decisions of the 25th Meeting of the Indian Central Coconut Committee regarding subjects coming within the purview of the Finance Sub-Committee.

The Committee accepted the Sub-Committee's recommendation that the action taken be noted and recorded.

*Subject No. 55.* Amendments to the Indian Central Coconut Committee Rules, 1945.



The Committee approved of the Sub-Committee's recommendation that the amendments be adopted with the addition of the words "each of the" between the words "on" and "minor".

*Subject No. 56.* The Indian Central Coconut Committee Provident Fund Rules – Revision of.

The Sub-Committee's recommendation to defer consideration of the revised rules pending further clarification was accepted by the Committee.

*Subject No. 57.* Enhancement of power delegated to Secretary regarding grant of honorarium.

The Sub-Committee's recommendation to raise the limit from Rs. 50 to Rs. 100 was accepted by the Committee.

*Subject No. 58.* Local purchase of stationery – Ratification of President's sanction.

The Committee adopted the Sub-Committee's recommendation that the President's sanction for the local purchases already made and for future purchases to be made from the Controller of Stationery, Kerala, be ratified.

*Subject No. 59.* Office of the Indian Central Coconut Committee – Temporary posts of one Office Assistant, one Clerk and one Artist Photographer – Continuance on long-term basis of.

The Sub-Committee's recommendation that the temporary posts of one Office Assistant, one Clerk, and one Artist Photographer at the Office of the Indian Central Coconut Committee be continued on a long-term basis was accepted by the Committee.

*Subject No. 60.* Central Commodity Committees – Conditions of service to be offered to the temporary employees of the Committee appointed to posts created for a period of three years or less.

The Committee accepted the Sub-Committee's recommendation that the new conditions of service to be

offered to the temporary employees of the Committee appointed to posts created for a period of 3 years or less, as suggested by the Ministry of Food and Agriculture, Government of India, be accepted, with the proviso that this condition will apply only to future entrants.

*Subject No. 61.* Ratification of President's sanction for the payment of special pay for handling cash etc. to the Assistant Accountant of the Office of the Indian Central Coconut Committee.

The Sub-Committee's recommendation that the President's sanction for the payment of special pay to the Assistant Accountant of the Office of the Committee during the period he acted for the Accountant, be ratified, was accepted by the Committee.

*Subject No. 62.* Indian Council of Agricultural Research's Scheme for sale of Monographs issued by Commodity Committees-President's sanction for the Indian Central Coconut Committee's participation in - Ratification of.

The Committee accepted the Sub-Committee's recommendation that the President's sanction for participation of the Committee in the scheme of the Indian Council of Agricultural Research for the sale of Monographs issued by the Commodity Committees be ratified. The Sub-Committee's recommendation that members of the Coconut Committee who desire to have copies of the Coconut Atlas and the Coconut Monograph may be given one copy each free of cost, was also accepted by the Committee.

Accepting another recommendation of the Sub-Committee, the Committee passed the following resolution:—

“This Committee resolves to record its deep appreciation of the excellent work done by Dr. K. P. V. Menon and Dr. K. M. Pandalai in compiling the Monograph on the Coconut Palm”.



The Committee accepted the President's suggestion that the Committee's appreciation of the work done by Dr. Menon and Dr. Pandalai be recorded in their personal files. The Committee further decided that 2,000 copies of a cheaper edition of the Monograph be brought out.

*Subject No. 63.* Central Coconut Research Station, Kayangulam - Refixation of rent for the portion of Rest House occupied by Dr. K. P. V. Menon, Director.

The Sub-Committee's recommendation that the Central P. W. D. be requested to fix the fair rent payable for the portion of the house occupied by Dr. Menon and that he be charged only such amount from 1-1-1951, the date of his representation for revision of rent, was accepted by the Committee.

*Subject No. 64.* Central Coconut Research Station, Kayangulam - Temporary post of Head Assistant - Placing on long-term basis - Proposal for.

The Sub-Committee's recommendation to place on long-term basis the temporary post of Head Assistant in the office of the Central Coconut Research Station, Kayangulam was accepted by the Committee.

*Subject No. 65.* Central Coconut Research Station, Kayangulam - Application for registering for Ph. D. degree (Research) of the Kerala University from Shri G. Bhaskaran Pillai, Research Assistant (Grade I) in Entomology - President's sanction - Ratification of.

The Committee accepted the Sub-Committee's recommendation that the President's sanction to Shri G. Bhaskaran Pillai for getting his name registered as a candidate for Ph. D. degree (by research) and for utilising the data collected from the work carried out by him for submission for the thesis, be ratified.

The Committee also accepted the Sub-Committee's recommendation that Dr. Chandy Kurian, Entomologist of the Central Coconut Research Station, Kayangulam

be permitted to supervise the work of Shri Pillai for his Ph. D. Degree.

*Subject No. 66.* Central Coconut Research Station, Kasaragod - Application for registration for M. Sc. degree (Research) of the Kerala University from Shri P. L. Ramanandan, Research Assistant (Grade I) - Sanctioning of.

The Committee accepted the Sub-Committee's recommendation that the action taken by the Secretary in forwarding the application of Shri P. L. Ramanandan for registration of his name as candidate for the M. Sc. degree (by research) of the Kerala University be ratified and that Shri Ramanandan be accorded permission for utilising the data collected by him from the work carried out by him in the Research Station for submission of his thesis for the M. Sc. degree.

The Committee also accepted the Sub-Committee's recommendation to accord permission to Dr. K. M. Pandalai, Joint Director, Central Coconut Research Station, Kasaragod, to supervise the work of Shri P. L. Ramanandan for his degree.

*Subject No. 67.* Central Coconut Research Station, Kasaragod - Supply of furniture by Shri K.C. Kumaran, Contractor, Kozhikode - Waiver of penalty.

The Sub-Committee's recommendation that the levy of penalty for the late supply of furniture by Shri K. C. Kumaran, Contractor, Kozhikode be waived as the delay was consequent on factors beyond his control, was accepted by the Committee.

*Subject No. 68.* Central Coconut Research Station, Kasaragod - Request for additional ministerial staff.

The Sub-Committee's recommendation that a Stenographer's post in the Office of the Central Coconut Research Station, Kasaragod be sanctioned for a period of 5 years was accepted by the Committee.



*Subject No. 69.* Central Coconut Research Station, Kasaragod – Rules regulating the use of station waggon.

The Committee accepted the Sub-Committee's recommendation that the rules regarding the use of station waggon be approved with the changes that in clause (vi) of rule 12 'two' may be changed to 'twelve' and in rule 13 instead of 'para (2)', 'section two' be inserted.

*Subject No. 70.* Scheme for the Establishment of Coconut Nurseries in Travancore - Grant-in-aid Statements and Audit Certificates for 1954-55.

The Committee accepted the Sub-Committee's recommendation that the grant-in-aid statements and audit certificates for 1954-55 be accepted.

*Subject No. 71.* Scheme for the Establishment of Coconut Nursery at Hebbal in Mysore State – Grant-in-aid Statements and Audit Certificates for the years 1951-52 to 1955-56.

The Committee accepted the Sub-Committee's recommendation that the grant-in-aid statements and audit certificates for 1951-52 to 1955-56 be approved.

*Subject No. 71-A.* Central Coconut Research Stations at Kasaragod and Kayangulam – Proposal for revision of the pay scale of Laboratory Attenders at.

The Committee accepted the Sub-Committee's recommendation that 25 per cent of the number of permanent posts of Laboratory Attender be declared as Grade I posts, that the scale of pay of these posts be fixed at Rs. 40-1-50-2-60 and that the remaining posts be declared as Grade II posts.

*Subject No. 71-B.* Grant of house-building loans to the servants of the Indian Central Coconut Committee.

The Sub-Committee's recommendation that the Government of India be requested to sanction a loan of

Rs. 3 lakhs for the grant of building loans for the Committee's servants was accepted by the Committee.

### **Decisions on subjects coming within the purview of the Scientific Appointments Sub-Committee**

*Subject No. 72.* Central Coconut Research Station, Kasaragod – Filling up of certain technical posts.

*1. Botanist, Central Coconut Research Station, Kasaragod.*

The Committee accepted the Sub-Committee's recommendation that Dr. C. A. Ninan, Department of Botany, University College, Trivandrum be appointed as the Botanist on an initial salary of Rs. 500 per mensem in the scale of Rs. 275-25-500-EB-30-650-EB-30-800 and that in case Dr. Ninan did not join, Shri C. Kempanna, Lecturer in Botany, Agricultural College, Hebbal, P. O. Bangalore be offered the post in the minimum of the scale.

The Committee also accepted the Sub-Committee's recommendation that Sarvashri T. A. Davis and K. Satyabalan might be sent up to the Indian Agricultural Research Institute, New Delhi for the M. Sc. course and that they be granted all the leave that they were eligible to and after that awarded a fellowship of Rs. 150 per mensem for the remaining period of the course.

*2. Chemical Engineer, Central Coconut Research Station Kasaragod.*

The Committee adopted the Sub-Committee's recommendation that Shri N. Rajasekharan, Plant Chemist, Central Food Technological Research Institute, Mysore be appointed as Chemical Engineer and that in case he failed to join, Shri P. M. Antony, C/o F.A.C.T., Udyogamandal, P.O., Alwaye be offered the post.



3. *Research Assistant (Grade II) in Agronomy, Central Coconut Research Station, Kasaragod.*

The Committee accepted the Sub-Committee's recommendation that Shri K. A. Parameswara Iyer, Mankompu, be appointed to the post and that in case Shri Iyer failed to join, Shri T. K. Bhaskara Panicker, Ambalapuzha be offered the post.

*Subject No. 72-A. Central Coconut Research Station, Kasaragod – Filling up of post of Research Assistant (Grade I) under the Second Five-Year Plan and certain technical posts under the Hormone Spraying Scheme.*

1. *Research Assistant (Grade I) in the Cyto-Anatomy.*

The Sub-Committee's recommendation that Kumari T. O. Prasanna Kumari, Research Assistant (Grade II), Central Coconut Research Station, Kayangulam be promoted to the post of Research Assistant (Grade I) in Cyto-Anatomy was accepted by the Committee.

2. *Research Assistant (Grade I) in the Hormone Spraying Scheme.*

The Sub-Committee's recommendation that Shri R. Gopinathan Nair, Research Assistant (Grade II), Central Coconut Research Station, Kasaragod be promoted to the post of Research Assistant (Grade I) in the Hormone Spraying Scheme was accepted by the Committee. The Committee also accepted the Sub-Committee's recommendation that since Shri K. J. Thommen was the senior most among the four candidates and in view of the fact that he had already acquired considerable experience in Virus Pathology, the post of Research Assistant (Grade II), in Virus Pathology be up-graded to that of (Grade I) and Shri K. J. Thommen promoted to it.

*Subject No. 73. Recommendation of the Sub-Committees other than the Finance Sub-Committee having Financial Commitments.*

The Committee approved the financial commitments noted below:—

<i>Subject No.</i>	<i>Details of Expenditure</i>	<i>1959-'60 Rs.</i>	<i>Total Rs.</i>
<i>Agricultural Research and Development Sub-Committee Research Wing Subject</i>			
15	Regional Coconut Research Stations in Kerala State – Review of work done at	14,888	45,000
<i>Development Wing Subjects</i>			
31	Coconut Nursery Scheme in Ollukara, Kerala State – Extension Proposal	2,575	12,876
38	Scheme for the establishment of a coconut nursery in the northern part of West Bengal (at 33 $\frac{1}{3}$ % of the recurring expenditure	1,804	2,706
30 & 40	Parasite Breeding Stations, Kerala State – Review of work and Progress Report		
	(a) Starting a new Station at Trichur and expenditure for additional staff required for existing stations (for 2 years)	6,600	15,020
	(b) Training of Dr. Chandy Kurian at the Indian Agricultural Research Institute, New Delhi and Shri Antony at Bangalore	1,200	1,200
	(c) Appointment of an Assistant Entomologist for two years	1,800	3,780
25	Coconut Fertilizer Demonstration Scheme – Indian Central Coconut Committee to take over certain demonstration fields	2,500	12,500



*General*

Creation of a post of a Chief Coconut Development Officer for five years (Pay and allowances)	17,000	1,69,000
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*Marketing & Economics Sub-Committee Subjects*

50	Scheme for the organisation of 3 Co-operative Coconut Marketing Societies, Andhra Pradesh	9,434	20,641
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**Receipts**

31	Coconut Nursery Scheme, Ollukkara, Kerala State - Extension Proposal	1,267	6,335
38	Scheme for the establishment of a Coconut Nursery in the northern part of West Bengal	449	673

*Subject No. 74.* Authorisation of a Member of the Committee to discharge certain functions such as countersigning cheques.

The Committee passed unanimously the following resolution moved from the Chair:—

“Resolved to authorise Shri B. M. Peter, a member of the Committee, to exercise the functions specified in sub-rule Rule (3) of Rule 23 of the Indian Central Coconut Committee Rules, 1945 from the 15th March 1959”.

**Resolution**

The following resolution moved by Shri R. Srinivasa Iyer, and seconded by Shri S. R. Sabariperumal Pillai, was passed by the Committee.

“That a delegation of this Committee consisting of an expert from the Indian Council of Agricultural Research, an expert in oil extraction, with one representative of growers and manufacturers of copra and oil be

sent to Ceylon, Philippines, Indonesia and Malaya to study and report on the following matters:—

- a) Methods adopted in planting, growing and manuring of coconuts.
- b) Quick manufacture of copra from raw coconuts.
- c) Extraction and manufacture of oil and other subsidiary products.
- d) Preservation of oil and oil cake.
- e) Such other matters as the Committee may desire”.

The President next thanked the Vice-President for the close and intimate interest he continued to take in the affairs of the Committee and Dr. B. P. Pal and Dr. S. M. Sikka for guiding the deliberations of the Research and Development Wings respectively of the Agricultural Research and Development Sub-Committee. He also thanked Dr. Bhatia for guiding the discussions in the Technological Sub-Committee and Experts like M/s. C. M. John and P. B. Kurup for helping the Committee with their advice.

The President thanked Shri. P. D. Nair, until recently Director of Agriculture, Kerala, for attending the meetings of the Sub-Committees and of the Committee and continuing his keen interest in the Committee's work. He thanked all the members who had attended the meeting, particularly M/s. R. Srinivasa Iyer, S. R. Sabariperumal Pillai and K. P. Amrithanatha Iyer for their contributions to the Committee's deliberations.

The President expressed pleasure at the fact that the Directors of Agriculture or their representatives had attended the meeting and thanked M/s. Sivasankara Menon and C. R. Seshadri and Drs. Mohite, Barooah and Chaudhuri.

The President thanked the Government of Kerala for the facilities they had afforded for holding the meeting and the Director of Agriculture and his staff for all the help and assistance they had rendered to make the meeting a success.



Shri R. Srinivasa Iyer thanked, on behalf of the members, the President, the Vice-President and the various experts and expressed appreciation of the work of the Committee's staff for circulating in time the proceedings of the Sub-Committees.

The meeting terminated at 1.30 P. M.

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## APPENDIX I

Proceedings of the meeting of the Special Sub-Committee constituted for suggesting ways and means for controlling the rhinoceros beetle held at 8 P. M. on 14th January, 1959 at the Rest House, Trivandrum.

The following were present:-

1. Shri C. M. John - Chairman.
2. Dr. K. P. V. Menon.
3. Dr. E. S. Narayanan.
4. Shri P. M. Kochappa Menon.
5. Shri R. Srinivasa Iyer.
6. Dr. P. J. Gregory - Secretary.

The Special Sub-Committee discussed the various aspects of rhinoceros beetle control and drafted the following note:-

### **Note on ways and means of controlling the Rhinoceros beetle.**

Rhinoceros beetle (*Oryctes rhinoceros*) is the most destructive pest of the coconut palm and is found to infest the palms all over India. The attack is particularly severe in areas where large quantities of cattle manures and other organic matter are allowed to rot and decompose.

The following methods which have been found to be efficient are recommended for adoption on an extensive scale:-

- 1) The best method of controlling the rhinoceros beetle is to check its multiplication in the breeding places, viz., compost and manure heaps, decaying stems of coconuts, leaves etc. by treating them with insecticides.

Among the insecticides which have been used and found useful and efficient are BHC (0.1%) and Chlordane (0.1%). The insecticide prepared in proper strength should be applied to the breeding places once in two months so as to drench the material sufficiently well. Such treatments will kill the larvae which emerge out.

This should be done on an intensive scale in a compact block so that the treatment may be effective for the whole area. This is very important since the beetles which breed out of untreated sources will fly and attack the palms in the treated areas.

This control measure should be adopted in the case of compost heaps of Municipalities and Panchayats where street sweepings and other rubbish materials are kept for long periods.

This is an important item of work since the beetles which profusely breed in these compost heaps infest the coconut palms of the neighbourhood. The Municipal subordinates concerned should be trained in the use of insecticides, by actual demonstration in the Municipalities concerned. The control of pest in the compost heaps of Municipalities should even be made compulsory by appropriate orders in the department of State Governments concerned.

2) Since the rhinoceros beetle breeds in large numbers in organic matter, it would be very necessary to keep the trees and the coconut garden clean and free from such sources. Organic matter which could be used as manure should be collected and kept in one or two places and treated with insecticides as mentioned under item (1).

3) The rhinoceros beetle may also be successfully controlled by the systematic collection and destruction of the beetles from the crown of the coconut palms by the beetle hook.

4) A mixture of sand and BHC powder 5% strength in equal proportions when applied to the leaf axil will kill the beetles visiting the coconut palms. One lb. of 5% BHC dust mixed with one lb. of sand will be sufficient for treating the leaf axils of one palm. This mixture should be applied every quarter.



5) Illustrated leaflets giving full details of the above-mentioned treatments should be prepared and published in English and local languages and distributed in large numbers. The Coconut Development Officer and National Extension Service Block Officers of the State should take interest in the campaign and make sufficient quantities of insecticides and literature available to the coconut growers for treatment on a block scale.

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## APPENDIX II.

Proceedings of the Special Sub-Committee set up by the Agricultural Research & Development Sub-Committee (Research Wing) at its meeting held on 14-1-1959 to make recommendations regarding the organisation of Coconut Research during the Third Five-Year Plan.

The following were present:

1. Dr. S. M. Sikka.
2. Dr. B. P. Pal.
3. Shri C. M. John.
4. Dr. G. R. Seth.
5. Dr. K. P. V. Menon.
6. Dr. K. M. Pandalai.
7. Shri. S. G. Aiyadurai.
8. Shri. D. P. Lakshminarasimhaiah.
9. Shri P. D. Nair.
10. Shri K. P. Amrithanatha Iyer.
11. Dr. P. J. Gregory.

The Special Sub-Committee considered the Working Paper On Coconut Research prepared by the Secretariat of the Committee and offered the following suggestions:-

1. The average yield of coconuts in India is low as compared to some other countries. This is evident from the fact that, while some parts of Ceylon and Philippines produce up to 4,000 nuts per acre per annum, the corresponding yield in this country is about 2,000. Survey of Indian coconut gardens has revealed that high-yielding "mother" palms, producing more than 200 nuts per year are met with in this country. In extreme cases,

the number of nuts goes up to 500 per tree. This shows that there is enough potentiality for stepping up the yield of nuts. Question is of selecting suitable base material for breeding work.

2. For making India self-sufficient with regard to her requirements of coconuts as expeditiously as possible the intensification of research on this commodity is very necessary. The efforts to be made in this direction are given hereunder:

**Item V (i) in the Working Paper: Strengthening and Expansion of work at the Central Coconut Research Stations at Kasaragod and Kayangulam.**

**A. Breeding**

There is ample evidence to show that by adopting proper criteria for selection of high-yielding mother palms and cross breeding suitable varieties, progenies with outstanding yield could be obtained. The work, however, is a rather long-range and complicated one, chiefly due to the fact that the coconut is a cross pollinated crop and the populations are highly heterozygous and it takes considerable time to assess the yielding capacities of the first or second generation progenies.

To get over these difficulties, a long-range planned programme of selection and breeding has to be undertaken.

Planting of elite seedlings, which would ultimately ensure cross pollination of desirable palms which will give progenies of high yielders, has to be undertaken both at the Committee's Central Coconut Research Stations and the Regional Coconut Research Stations in the different States to meet the demand for supplying quality seedlings for future planting programmes.

It is estimated that about 2,500 acres of elite plantations will have to be established in the various parts of India and provision made for cost of land and maintenance for a period of 15 years to cover the III, IV and V Plans.



### *Hybridisation.*

The hybrids of the Tall x Dwarfs already evolved do indicate the possibility of producing hybrids showing vigour both in growth and in yield. This work has to be further elaborated. Varieties of coconuts both exotic and indigenous may be used in such hybridisation studies. The combinability of exotic types with Indian one has to be further investigated. Suitable parents and combinations will have to be determined by undertaking a planned hybridisation programme and planting of progenies in the field and observing their performance for a number of years. This would involve additional area and staff.

### *Vegetative propagation*

Instances of poly-embryony and suckering in coconut palms have been found to occur in nature. Investigations have to be carried out to see if suckering could be induced in some of the high yielders so that they could be vegetatively propagated. The use of hormones and other chemicals for this investigation would be necessary. Horticultural practices like marcoting, gootying etc. may also be tried in this regard.

### *Inducing mutations by radiation*

Being a perennial crop with a life period of over 80 years, it would be very advantageous if some outstanding mutants are produced by irradiation and other modern techniques. This possibility should be fully investigated on a planned basis.

### *Correlation of palm characters with yield*

In most agricultural crops some of the morphological characters are correlated with yield and therefore correlation studies offer a very valuable field for picking out pre-potent high yielders. Earlier work on coconut has shown the existence of significant correlations between certain characters of the palm and its yield. This work should be further intensified including a correlation study of the leaf area of the palm. Such work will be best done through a close collaboration between the Breeder and the Statistician.

## B. Agronomy

There is considerable evidence to show that by carrying out proper agronomic practices the yield of coconuts could be stepped up by 35 per cent. Further work has to be developed on aspects of interculturing, manuring and irrigation for the different types of soils.

Machinery suitable for interculturing coconut gardens which could be efficiently used by manual labour and bullock power and medium sized hand tractors have to be evolved and experimented upon and their economics worked out. The ultimate object should be to reduce the cost of cultivation.

### *Irrigation*

Irrigation, particularly during the summer months, has been found to result in more than 50 per cent increase in production. Information, however, is lacking on the water requirements of the coconut (seedlings as well as the adult trees), frequency of irrigation, etc., both in relation to soil types and fertilizer treatment. Investigations regarding the best source of water, i. e. fresh *vs.* saline, well and tank *vs.* filter point will have to be carried out in the regions where such problems arise.

### *Manuring*

Although evidence has been gathered to show that the coconut responds to a balanced application of N.P.K. fertilizers over a basal dressing of organic matter, further detailed investigations appear to be necessary under cultivator's conditions. Model agronomic experiments on the cultural and manurial aspects may be laid out in select centres in the typical regions to gather additional and more precise data. The role of micronutrients in the physiology of the coconut palm deserves more elaborate investigation.

The use of radio isotopes and tracer techniques in the study of the nutrition and physiology of the coconut palm has to be taken up.



### C. Plant Protection

Investigations conducted have shown the possibility of controlling some pests and diseases of coconuts by adopting a systematic course of spraying insecticides and fungicides. Biological control measures have also been evolved for controlling the leaf eating caterpillar. These findings should be tested on a regional basis on compact blocks of sufficiently large extent (500 acres or more) so that the whole area gets protected. Isolated treatments by individual farmers failed to give the desired effect as pests and diseases migrate from the untreated to the treated fields. Such region-wise trials will also enable the research worker to make minor or suitable changes in the *modus operandi* evolved at the research centres. The backwater islands of Kuttanad (Kerala) where the leaf (wilt) diseases are highly in evidence require primary consideration.

Work has to be intensified on the pests and diseases for which adequate control measures have not yet been evolved. Investigations have to be initiated on the biological control of important coconut pests like the rhinoceros beetle and the palm weevil. The use of fungi in the biological control of insect pests requires further investigation. The possibility of increasing the fecundity of known parasites of coconut pests by the irradiation method may be studied. Trials have also to be made using different varieties of coconuts, both indigenous and exotic, which may be resistant to diseases and pests.

#### **Item V (ii) of the Working Paper: Continuance of the Existing Regional Coconut Research Stations and Establishment of new ones.**

The Special Sub-Committee felt that there was urgent necessity to start Regional Coconut Research Stations in West Bengal, the Andamans and the Laccadives.

The problems facing the coconut planters of the Andamans and the Laccadives are very different from those existing on the mainland. The coconut growers

of these islands are cut off from the mainland and they have no intimate contact with the results of research done on the mainland and, therefore, it is highly desirable to give high priority in the matter of establishing Regional Coconut Research Stations in these tracts.

The possibility of stepping up the production of coconuts in the Andaman and the Laccadives deserves adequate consideration.

The Sub-Committee felt that on the basis of the above suggestions the Working Paper on Coconut Research may be suitably revised.

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## APPENDIX I

### Secretary's Note

*Subject No. 6.* Proceedings of the Meeting of the Finance Sub-Committee held on the 22nd September 1958.

A meeting of the Finance Sub-Committee of the Committee was held on the 22nd September 1958 at the Central Coconut Research Station, Kasaragod. A copy of the proceedings of that meeting and copies of notes on the subjects included in the agenda are attached to this note.

The latest position regarding the action taken on the more important decisions of that meeting is indicated below:—

*Subject No. 1.* Revised Budget Estimates of the Committee for the year 1958-59 (Parts I and II).

The Revised Budget Estimates of the Committee for the year 1958-59 (Parts I and II) as modified by the Finance Sub-Committee have been forwarded to the Government of India for approval.

*Subject No. 2.* Budget Estimates of the Committee for the year 1959-60 (Parts I and II).

The Budget Estimates of the Committee for the year 1959-60 (Parts I and II) after effecting the modifications suggested by the Finance Sub-Committee have been forwarded to the Government of India for approval. Their sanction is awaited.

*Subject No. 3.* Construction of an Office Building for the Indian Central Coconut Committee at Ernakulam - proposal for.

The Finance Sub-Committee's recommendation for the construction of an Office Building for the Committee at its own cost has been conveyed to the Government of India. Their reply is awaited.

*Subject No. 5.* Excise duty on coconut oil - abolition of the exemption limit of 125 tons of oil produced per annum.

The Sub-Committee's decision has been duly communicated to the Government of India.

*Subject No. 9.* Organisation of Coconut Technological Research.

The Government of India's sanction for (1) scheme for the solvent extraction of coconut oil cake at the Regional Research Laboratory, Hyderabad, (2) scheme for the preparation of activated charcoal from coconut shell and (3) scheme for the coconut technological work at the Central Food Technological Research Institute, Mysore has been applied for.

*Subject No. 12.* Central Coconut Research Station, Kasaragod - Grant of lien to Shri P. K. Thomas on the post of Research Assistant (Grade I) and waiving of three months' notice.

The conditions laid down by the Committee for the grant of lien to Shri P. K. Thomas, Research Assistant (Grade I) at the Central Coconut Research Station, Kasaragod have been communicated to the Joint Director, Central Coconut Research Station, Kasaragod for communication to the former. The decision of the Sub-Committee not agreeing to waive the 3 months' notice in his case has also been communicated to the Joint Director likewise.

Shri T. R. Verghese, Clerk, Central Coconut Research Station; Kayangulam who left the Committee's service and went to the U. S. A. for higher studies has been asked to remit to the Committee his pay and allowances for the period for which his notice falls short of the three-month period.

*Subject No. 14.* Transfer to the Committee of 25 cents of land adjoining the Central Coconut Research Station, Kasaragod - execution of sale deed.

The Kerala Government has been requested to revise the draft sale deed in the light of certain modifications suggested by the Government of India. The sale deed will be executed as soon as the revised deed is received from the Kerala Government.



*Subject No. 15.* Copra kiln constructed at Badagara - execution of sale deed.

Certain details of the kiln have been called for from the Malabar District Co-operative Produce Sale Society, Kozhikode. Necessary action for the execution of the sale deed as decided by the Sub-Committee will be taken as soon as these details are received from the Society.

*Subject No. 17.* Coconut Nurseries at Nileshtar and Tikkoti - (Kerala State) - proposal for the extension of.

The proposal for the extension of the coconut nurseries at Nileshtar and Tikkoti for a period of five years as decided by the Sub-Committee has been forwarded to the Government of India for their sanction.

*Subject No. 19.* Parasite Breeding Station at Kasaragod - proposal for the continuance of.

The Sub-Committee's approval for the extension of the Parasite Breeding Station at Kasaragod for a period of 2 years has been communicated to the Government of India for sanction.

*Subject No. 22.* Comprehensive Coconut Nursery Scheme Andhra Pradesh - proposal for the extension of.

When the proposal for the extension of the above scheme was communicated to the Government of India, they had stated that they are averse to accord *ex-post-facto* sanction to any scheme without valid reasons. This is being referred to the Andhra Pradesh Government.

*Subject No. 23.* Scheme for the maintenance of a collection block of representative varieties of coconut in Assam - proposal for the extension of.

The Government of India's sanction for the extension of the above scheme has been applied for.

*Subject No. 29.* Proposal of the Palm Gur Adviser to investigate the effect of tapping on the yield of coconut palms.

The Palm Gur Adviser to whom the Sub-Committee's decision was communicated has now intimated that he is making necessary arrangements for starting the experiments at the Central Coconut Research Stations, Kasaragod and Kayangulam.

The Proceedings of the meeting of the Finance Sub-Committee are for the information of the full Committee.

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Proceedings of the meeting of the Finance Sub-Committee of the Indian Central Coconut Committee held at 11 A. M. on 22-9-1958 at the Central Coconut Research Station, Kayangulam.

The following members were present:—

1. Shri K. P. Madhavan Nair – Chairman.
2. Shri V. J. Joseph.
3. Shri A. R. Sulaiman Sait.
4. Shri P. B. Kurup.
5. Shri V. Eacharan.
6. Dr. P. J. Gregory – Secretary.

The Director, Central Coconut Research Station, Kayangulam and the Joint Director, Central Coconut Research Station, Kasaragod, also attended the meeting.

Messrs. T. Bhaskara Rao and C. H. Lingadevaru had expressed their inability to attend the meeting.

The President, Indian Central Coconut Committee, Shri B. M. Peter and the Director of Agriculture, Kerala State did not attend the meeting.

*Subject No. 1.* Revised Budget Estimates of the Committee for the year 1958-59 (Parts I&II). The Sub-Committee approved of the revised budget for 1958-59 subject to the following modification.

That the provision made under the head "I. A. Administration – 5 Allowances and Honoraria, (a) Travelling Allowance" for meeting the T. A. of the Secretary in connection with his tour to the Philippines be deleted as the Government of India have since decided that none need attend the conference at Manila.



The Sub-Committee also decided to authorise the Secretary to make the necessary changes in the Revised Budget Estimates in the light of the decisions taken by the Sub-Committee on the other subjects on the agenda.

The Sub-Committee further decided that the present practice of sending Revised Budget Estimates to the Government of India be continued, but that as the Government of India's sanction for the Revised Budget Estimates is usually received only towards the fag end of the year, the Government of India be requested to sanction supplementary grants for meeting the expenditure involved.

The Sub-Committee felt that its work was considerably handicapped due to the absence of the Director of Agriculture, Kerala State at this meeting and therefore decided to request the Kerala Government to depute the Director of Agriculture or his representative to attend the future meetings of the Sub-Committee, so that matters relating to the State might be adequately explained at the meeting.

The Chairman suggested that as the Full Committee meets only once a year, meetings of the different Sub-Committees might be held in between the Committee's meetings to consider subjects coming within their purview. The suggestion was approved by the Sub-Committee.

*Subject No. 2.* Budget Estimates of the Committee for the year 1959-60 (Parts I & II).

The Sub-Committee approved of the Budget Estimates for 1959-60 subject to the following conditions:-

1) A sum of Rs. 5,000/- be provided as item 7 under the head "II Agricultural Research - C. Miscellaneous" in the Part I Budget for meeting the expenditure on the Indian Council of Agricultural Research Scheme for Hormone Spraying at the Central Coconut Research Station, Kasaragod.

2) A sum of Rs. 59,135/- be provided in the Part II Budget as item IV C for meeting the expenditure on the diseases investigation scheme of the Andhra Pradesh Government.

3) A sum of Rs. 4,000/- be provided under the head "Layout" in the Part II Budget of the Central Coconut Research Station, Kayangulam.

4) As the provision of Rs. 30,000/- made in the Revised Budget Estimates (Part II) for 1958-59 of the Central Coconut Research Station, Kasaragod towards cost of 30 acres of land, is found to be quite insufficient, a sum of Rs. 1,00,000/- be provided under the head "Cost of land" in the Part II Budget of the Station. If the sum of Rs. 30,000/- provided in the Revised Budget Estimates for 1958-59 is, for some reason or other, not spent during the year, the Government of India be requested to sanction a supplementary grant of Rs. 30,000 for the purpose to be expended during 1959-60.

*Subject No. 3.* Construction of an Office Building for the Indian Central Coconut Committee at Ernakulam – Proposal for.

The Sub-Committee decided that in view of the difficulty experienced in accommodating even the existing staff in the Committee's Office in the present premises not to speak of those who would be appointed to vacant posts in the future, the difficulty in getting a suitable building on rent and the improved financial position of the Committee at present, it was highly necessary that an office building should be constructed for the Committee at Ernakulam as early as possible and that this should be given top priority. The Sub-Committee also decided that a sum of Rs. 75,000/- be provided in the Committee's Revised Budget Estimates (Part I) for 1958-59 to meet the cost of acquisition of a site and Rs. 2.25 lakhs in the Revised Budget Estimates for 1959-60 (Part I) for construction of the Office Building.

*Subject No. 4.* Proposal to abolish cess on copra and to finance the Indian Central Coconut Committee with a grant from the Excise Duty on Coconut Oil.

The Sub-Committee noted the Government of India's decision not to accede to the Committee's request



to abolish the cess on copra and to finance the Committee with an annual grant from the Excise Duty on Coconut Oil.

*Subject No. 5.*      Excise Duty on Coconut Oil – Abolition of the exemption limit of 125 tons of oil produced per annum.

The Sub-Committee decided that the Government of India be requested again to levy Excise Duty on all Coconut Oil produced in mills irrespective of the quantity produced.

*Subject No. 6.*      Relaxation of import restriction on Copra and Coconut Oil.

The Sub-Committee noted that the Secretary had suggested to the Government of India that imports of copra only be allowed, that import licences be restricted to "Actual Users" only, and that the total imports per annum be limited to 50,000 tons of copra. The Sub-Committee decided that no modifications to the above suggestions were necessary.

*Subject No. 7.*      Amendments to the Indian Central Coconut Committee Provident Fund Rules.

The Chairman pointed out that there was no inconsistency between the amended Rule 8 (3) and Rule 11 (4) of the Indian Central Coconut Committee Provident Fund Rules. He said that the Committee's contribution would be a payment to the Fund and not a payment to the subscriber. The subscriber would be entitled to claim the Committee's contribution only after completing three years of service under the Committee.

The Sub-Committee thereupon decided that the Government of India might be told that there was no inconsistency between the amended Rule 8 (3) and Rule 11 (4) of the Indian Central Coconut Committee Provident Fund Rules.

*Subject No. 8.*      Indian Central Coconut Committee Provident Fund Account – Fixation of rate of interest for the year 1958-59.

The Sub-Committee decided that the rate at which interest is to be credited to the accounts of the subscribers to the Committee's Provident Fund for the year 1958-59 be fixed at the rate to be prescribed by the Government of India. The Sub-Committee also agreed to make a special contribution of such amount as may enable payment of interest at the above rate.

*Subject No. 9.* Organisation of Coconut Technological Research.

The Sub-Committee approved of the financial commitments mentioned in the Secretariat note arising out of the recommendations of the Technological Sub-Committee.

*Subject No. 10.* Ratification of President's sanction for the purchase of one Royal Portable Typewriter and one Royal Standard Typewriter for the Office of the Committee.

The Sub-Committee ratified the sanction accorded by the President for purchasing one Royal Portable Typewriter and one Royal Standard Typewriter for the Committee's Office.

The Chairman, however, suggested that cost of the two typewriters be debited if possible to the Part II Budget of the Committee. The suggestion was approved by the Sub-Committee.

*Subject No. 11.* "General Conditions applicable to grants made by the Indian Central Coconut Committee"- Modification to.

The Sub-Committee decided that the "General Conditions applicable to grants made by the Indian Central Coconut Committee" be modified as suggested by the Secretary to fall in line with those of the Indian Council of Agricultural Research.

The Chairman, however, pointed out that it would be better to have a general provision that the "General Conditions applicable to grants made by the Indian Central Coconut Committee" will be the same as those relating to the grants made by the "Indian Council of



Agricultural Research" so that every time the Indian Council of Agricultural Research makes any change in their rules it need not come before this Committee. The Chairman's view was accepted by the Sub-Committee.

*Subject No. 12.* Central Coconut Research Station, Kasaragod—Grant of lien to Shri P. K. Thomas on the post of Research Assistant (Grade I) and waiving of three months' notice.

The Sub-Committee decided that Shri P. K. Thomas be granted lien on the post of Research Assistant (Grade I) subject to the following conditions:—

1) That, while on foreign service, he will not be entitled to any leave or leave salary from the Committee;

2) that during the period of his foreign service, he may, if he wishes, continue to subscribe to the Committee's Contributory Provident Fund in which case he should also remit regularly the employer's contribution to the fund; and

3) that his T. A. for joining the new post under the Indian Council of Agricultural Research and for his reversion to the permanent post under the Committee is met by him.

The Sub-Committee also decided that, in view of the decision taken by the Indian Central Coconut Committee at its 25th meeting that three months' notice should be strictly enforced in future, the requests of Shri P. K. Thomas for waiving the condition of giving 3 months' notice and refunding to him the sum of Rs. 960/- remitted by him in lieu of the 2 months' pay and allowances, could not be complied with. The Sub-Committee also decided that Shri T. R. Verghese, Clerk, Central Coconut Research Station, Kayangulam, who has left the Committee's service and gone to the U. S. A. for higher studies without giving full 3 months' notice, be asked to remit to the Committee immediately his pay and allowances (as clerk, Central Coconut Research Station, Kayangulam) for the period for which his notice falls short of the 3 months period and that in case the

remittance was not made immediately, the matter be taken up with the concerned authorities in the U. S. A.

*Subject No. 13.* Scheme for the supply of seed coconuts to State Governments and for the establishment of a coconut nursery under the Committee.

The Secretary pointed out that the scheme for the supply of seed coconuts to the State Governments was sanctioned by the President of the Committee subject to ratification by the Committee, and that therefore the Sub-Committee might ratify the President's sanction.

The Sub-Committee ratified the sanction accorded by the President and decided that the scheme be continued as a regular activity of the Central Coconut Research Station, Kasaragod. The Sub-Committee felt that the supply of seed coconuts to the State Governments would be a real service which the Committee could do. It was also decided that the entire expenditure on the pay and allowances of the staff under the scheme should be met by the Committee and that the actual cost of seednuts, the charges for collecting and transporting them and the railway freight to the destination might be collected from the State Governments in advance.

The Sub-Committee also felt that in view of the experience gained, it would not be difficult to estimate the cost of seednuts including the incidental charges and railway freight to the different States, and decided that the Joint Director, Central Coconut Research Station, Kasaragod be asked to calculate the rate at which advance might be obtained from each of the State Governments and communicate the information to the Secretary immediately to enable him to find out the seednut requirements of the different States and to collect advance payment from them.

The Sub-Committee also decided that the services of the staff under the scheme be utilised for marking mother palms from which the coconut growers could collect seednuts for raising their own seedlings and for



follow-up work relating to the coconut seedlings supplied from the nursery at the Kasaragod Station.

In view of certain practical difficulties pointed out by the Joint Director, Central Coconut Research Station, Kasaragod the Sub-Committee decided that the question of establishing a sub-nursery under the Committee might be deferred for the present. It was also decided that surplus seednuts, if any, might be planted at the Kasaragod Station and supplied as seedlings in the usual manner from Kasaragod.

*Subject No. 14.* Transfer to the Committee of 35 cents of land adjoining the Central Coconut Research Station, Kasaragod - Execution of sale deed.

The Sub-Committee passed the following resolution authorising the President and Secretary of the Committee to execute the sale deed relating to the transfer to the Committee of the 35 cents of land:-

“Resolved that under Sub-rules 2 and 3 of Rule 15 of the Indian Central Coconut Committee Rules, 1945, the President and Secretary of the Indian Central Coconut Committee be authorised to execute, on behalf of the Committee, the sale deed in respect of 35 cents of land, R. S. Nos. 32-1 (0.14 acres), 33-1 (0.17 acres) and 34-1 (0.04 acres) of Kudlu Village, Kasaragod Taluk, Cannanore District.”

*Subject No. 15.* Copra Kiln constructed at Badagara - execution of Sale Deed.

The Sub-Committee decided to authorise the President and Secretary of the Committee to execute, on behalf of the Committee, the Sale Deed relating to the sale of the copra kiln constructed at Badagara and passed the following resolution in that connection:-

“Resolved that under Sub-rules 2 and 3 of Rule 15 of the Indian Central Coconut Committee Rules, 1945, the President and Secretary of the Indian Central Coconut Committee be authorised to execute on behalf of the Committee the Sale Deed in respect of the sale to the Malabar District Co-operative Produce Sale Society,

Kozhikode, of the copra kiln constructed in the premises of the Badagara Branch of the Society ”.

*Subject No. 16.* Regional Coconut Research Stations in Kerala State – Review of work done at – Report on.

The Sub-Committee decided that the Regional Coconut Research Stations at Kumarakom and Neyyattinkara be continued for a further period of one year from the 22nd December, 1958 subject to the recommendations made in the joint report of Shri C. M. John and Dr. K. M. Pandalai and that the Station at Thodupuzha be closed down on the 21st December, 1958, on the termination of the sanctioned period.

The Sub-Committee also approved of the recommendation of Shri C. M. John and Dr. K. M. Pandalai to continue at Thodupuzha the coconut nursery attached to the Regional Coconut Research Station at that place even after the closure of the research station.

It was also decided that the Kerala Government might be requested to follow-up the results of the experiments conducted at the Regional Coconut Research Station, Thodupuzha after the closure of the Station as the information would be useful.

*Subject No. 17.* Coconut nurseries at Nileshtar and Tikkoti (Kerala State) – Proposal for the extension of.

The Sub-Committee decided that the coconut nurseries at Nileshtar and Tikkoti be extended for a further period of 5 years from 1-10-1958 and agreed to meet a net expenditure of Rs. 4,587/- on the Nileshtar nursery and Rs. 6,026 on the Tikkoti nursery in accordance with the “General Conditions applicable to grants made by the Indian Central Coconut Committee”.

*Subject No. 18.* Scheme for starting a coconut nursery in the National Extension Service Block, Ranni, Kerala State – Payment of additional subsidy.

The Sub-Committee could not find its way to accede to the request of the Development Commissioner,



Kerala State, that the Committee might bear the entire loss on the scheme amounting to Rs. 1,301.50 instead of meeting the sanctioned amount of Rs. 865/- only.

The Sub-Committee also decided that the Development Commissioner, Kerala State, be requested to arrange to start the remaining National Extension Service nurseries sanctioned for the State.

*Subject No. 19.* Parasite Breeding Station at Kasaragod—  
Proposal for the continuance of.

The Sub-Committee approved of the proposal for continuing the Station for a period of 2 years from 4-12-1958 subject to the condition that the provisions made for rent on office and laboratory is met entirely by the State Government.

*Subject No. 20.* Scheme for an enquiry into the cost of cultivation of coconuts in Madras State.

The Sub-Committee decided that the Madras Government be informed that their scheme for a survey to ascertain the cost of cultivation of coconut in Madras State would be taken up for consideration as soon as the results of the survey in Kerala State became available.

*Subject No. 21.* Correct estimation of area and yield of coconuts and arecanuts – Scheme under the II Five-Year Plan for Mysore State.

The Sub-Committee approved of the changes suggested in the designation of the staff sanctioned under the scheme and also agreed to the proposal to give a higher starting pay of Rs. 150/- to the Senior Statistical Assistant in the scale of Rs. 120-6-150-10-220.

*Subject No. 22.* Comprehensive coconut nursery scheme, Andhra Pradesh – Proposal for the extension of.

The Sub-Committee approved of the proposal for extending the scheme for a period of 4 years from 1-4-1957 at a net cost to the Committee not exceeding Rs. 798/-.

*Subject No. 23.* Scheme for the maintenance of a collection block of representative

varieties of coconuts in Assam—Proposal for the extension of.

The Sub-Committee approved of the proposal for extending the scheme for a further period of 5 years from 1-1-1959 subject to the "General Conditions applicable to grants made by the Indian Central Coconut Committee" and agreed to meet an expenditure not exceeding Rs. 1,664/- spread over a period of 5 years.

*Subject No. 24.* Scheme for the establishment of three Regional Coconut Research Stations in Travancore – grant-in-aid statement for the year 1954-55.

The Sub-Committee approved of the grant-in-aid statement subject to the condition that the Committee's share of expenditure for the entire sanctioned period of the scheme would not exceed Rs. 1,30,105/-.

The Sub-Committee also decided to request the Kerala Government that the statements relating to the scheme should be sent as soon after the closure of the concerned year as possible, as otherwise the purpose of the statements would not be served.

*Subject No. 25.* Scheme for the establishment of coconut nurseries in Travancore – Grant-in-aid statement and audit certificate for 1953-54.

The Sub-Committee approved of the grant-in-aid statement and audit certificate subject to the remark that the future statements and certificates be sent in time.

*Subject No. 26.* Scheme for the control of *Nephantis serinopa* in Travancore-Cochin – Grant in-aid statements and audit certificates for the years 1954-55 and 1955-56.

The Sub-Committee approved of the grant-in-aid statements and audit certificates for the years 1954-55 and 1955-56 in respect of the above scheme.

*Subject No. 27.* Regional Coconut Research Station, Ratnagiri (Bombay State) – Grant of water allowance to staff.



The Sub-Committee sanctioned an expenditure of Rs. 93.01 for paying water allowance to the staff of the Regional Coconut Research Station, Ratnagiri, on condition that the expenditure was met from within the allotment sanctioned for the scheme, and that the head of the Station certified that the incumbents for whom the allowance was claimed had obtained water at a price adding materially to the cost of living.

*Subject No. 28.* Scheme for the appointment of Coconut Propaganda Officer and Staff — Grant-in-aid statements and audit certificates for the years 1952-53 and 1953-54.

The Sub-Committee accepted the grant-in-aid statements and audit certificates subject to the remark that the subsequent statements and certificates be expedited.

*Subject No. 29.* Proposal of the Palm Gur Adviser to investigate the effect of tapping on the yield of coconut palms.

The Sub-Committee felt that the experiment in question was a very desirable one, and that the coconut palms that could be spared for the purpose at the Central Coconut Research Stations, Kasaragod and Kayangulam be made available to the Khadi and Village Industries Commission for conducting the experiments.

*Subject No. 30.* Scheme for the installation of radio sets in regulated markets for dissemination of price information in respect of arecanuts and coconuts among producers.

The Sub-Committee decided not to approve of the scheme.

With a vote of thanks to the Chair the meeting terminated at 2 P. M.

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## AGENDA

1. Revised Budget Estimates of the Committee for the year 1958-'59 (Parts I & II).
2. Budget Estimates of the Committee for the year 1959-'60 (Parts I & II).
3. Construction of an Office Building for the Indian Central Coconut Committee at Ernakulam—proposal for.
4. Proposal to abolish cess on copra and to finance the Indian Central Coconut Committee with a grant from excise duty on coconut oil.
5. Excise duty on coconut oil—abolition of the exemption limit of 125 tons of oil produced per annum.
6. Relaxation of import restriction on copra and coconut oil.
7. Amendments to the Indian Central Coconut Committee Provident Fund Rules.
8. Indian Central Coconut Committee Provident Fund account—Fixation of rate of interest for the year 1958-'59.
9. Organisation of coconut technological research.
10. Ratification of President's sanction for the purchase of one Royal portable typewriter and one Royal Standard typewriter for the Office of the Committee.
11. "General Conditions applicable to grants made by the Indian Central Coconut Committee"—modification to.
12. Central Coconut Research Station, Kasaragod—grant of lien to Shri P. K. Thomas on the post of Research Assistant (Grade I) and waiving of three months' notice.
13. Scheme for the supply of seed coconuts to State Governments and for the establishment of a coconut nursery under the Committee.
14. Transfer to the Committee of 35 cents of land adjoining the Central Coconut Research Station, Kasaragod—execution of sale deed.



15. Copra Kiln constructed at Badagara – execution of sale deed.
16. Regional Coconut Research Stations in Kerala State – Review of work done at – Report on.
17. Coconut Nurseries at Nileshtar and Tikkoti (Kerala State) – proposal for the extension of.
18. Scheme for starting a coconut nursery in the National Extension Service Block, Ranni, Kerala State – Payment of additional subsidy.
19. Parasite Breeding Station at Kasaragod – proposal for the continuation of.
20. Scheme for an enquiry into the cost of cultivation of coconuts in Madras State.
21. Correct estimation of area and yield of coconuts and arecanuts – scheme under the Second Five-Year Plan for Mysore State.
22. Comprehensive Coconut Nursery Scheme, *Andhra Pradesh* – proposal for the extension of.
23. Scheme for the maintenance of a collection block of representative varieties of coconut in *Assam* – proposal for extension of.
24. Scheme for the establishment of three Regional Coconut Research Stations in Travancore – grant-in-aid statement for the year 1954-'55.
25. Scheme for the establishment of coconut nurseries in Travancore – grant-in-aid statement and audit certificate for 1953-'54.
26. Scheme for the control of *Nephantis serinopa* in Travancore-Cochin – grant-in-aid statements and audit certificates for the years, 1954-'55 and 1955-'56.
27. Regional Coconut Research Station, Ratnagiri (Bombay State) – grant of water allowance to staff.
28. Scheme for the appointment of Coconut Propaganda Officer and staff – grant-in-aid statements and audit certificates for the years 1952-'53 and 1953-'54.
29. Proposal of the Palm Gur Adviser to investigate tapping of coconut palm as a means of increasing yield.

30. Scheme for the installation of radio sets in Regulated Markets for dissemination of price information in respect of coconuts and arecanuts.

Any other business.

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*Subject No. 1. Revised Budget Estimates of the Committee for the year 1958-59 (Parts I and II).*

### **Revised Budget Estimates For 1958-59 (Part I).**

The Finance Sub-Committee had at its meeting held on the 18th October, 1957 approved of the Part I Budget Estimates of the Committee for the year 1958-59. The Estimates as approved by the Sub-Committee were duly sanctioned by the Government of India subject to the modification that on the receipt side a provision of Rs. 7.0 lakhs be made in the Part I Budget on account of copra cess collection during the year as against Rs. 6.0 lakhs estimated by the Sub-Committee and that the closing balance of the year be correspondingly enhanced by Rs. 1.0 lakh.

In the Revised Estimates presented now (Vide Annexures I to IV) care has been taken to keep the expenditure as low as possible.

The principal variations between the Budget Estimates as sanctioned by the Government of India and the Revised Estimates now presented are given below:—

#### **Receipts:—**

*Opening Balance:—* The opening balance in the Revised Budget Estimates is Rs. 3,95,236 as against only Rs. 1,34,165 in the sanctioned estimates (i. e.) about Rs. 2.61 lakhs more than that in the sanctioned estimates. The increase in the opening balance is due mainly to savings in expenditure in 1957-58 and receipt of an extra amount of Rs. 0.77 lakhs by way of coconut cess received in 1957-58.



1. *Coconut cess:-* The sanctioned provision of Rs. 7 lakhs has been retained under this head.

2. *Other receipts (a) Receipts from publications:-* The publication "The Coconut Palm – A Monograph" which is under print is expected to be ready for sale in a month or two. The receipts from the sale of this book are expected to be of the order of Rs. 10,000. A sum of Rs. 11,000 is estimated to be received by way of advertisement charges and the sale of the Hand-book on Coconut Cultivation, Coconut Atlas, Bulletin etc. These account for the enhanced provision of Rs. 21,000 under this head as against Rs. 8,000 only in the sanctioned Budget.

b) *Miscellaneous Receipts:-* A sum of Rs. 50,000 had been paid as advance to the Government of Kerala for the acquisition of a site in Ernakulam for construction of an office building for the Committee. The Government of India having expressed their inability to accord the necessary sanction in spite of repeated requests, the amount was received back from the Kerala Government only a month back and therefore the provision under "Miscellaneous Receipts" has been increased by Rs. 50,000. As the financial position of the Committee has now improved a little the question of the Committee purchasing a site and constructing a building of its own to house its office etc. has been placed once again for the consideration of this Sub-Committee.

c) *Farm Produce etc., Central Coconut Research Stations, Kasaragod and Kayangulam:-* While the variation in the estimated receipts from farm produce at the Central Coconut Research Station, Kayangulam is Rs. 150/- only, on account of the higher yield expected from the coconut palms in the Kasaragod Station the provision in the Revised Budget Estimates regarding farm receipts at this Station has been enhanced by Rs. 8,800 in the Revised Budget Estimates. A provision of Rs. 22,824 has also been made as receipts from the Scheme for the procurement and supply of seednuts to States started last year.

d) *Receipts from Indian Council of Agricultural Research:-* A scheme to investigate the effect of growth

regulating substances on coconuts financed by the Indian Council of Agricultural Research is proposed to be implemented at the Central Coconut Research Station, Kasaragod. A sum of Rs. 5,000 was received from the Indian Council of Agricultural Research in 1957-58 but the scheme has not yet been started on account of the difficulty of securing the hormones required for use in the scheme.

### **Expenditure:-**

#### **I. A. Administration (Committee's Office)**

From the details of expenditure under this head shown in Annexure II, it will be seen that excepting in a few cases, the provisions made in the Revised Budget Estimates are either the same as those in the Budget Estimates or slightly below them. The increase is mainly under "Indian Central Coconut Committee Provident Fund Contribution" (Rs. 2,000); "Travelling Allowance" (Rs. 4,000) "Postage, telegrams and telephones" (Rs. 1,000) and "Furniture and Office Equipments" (Rs. 1,000).

The enhanced provision under "Indian Central Coconut Committee Provident Fund Contribution" is necessary for crediting the Committee's contribution to the Provident Fund account of subscribers at the enhanced rate of 8½% with effect from September 1957 as per decision of the Committee at its last meeting and duly approved by the Government of India.

The enhancement under "Travelling Allowance" is to meet the Travelling Allowance of the Secretary in connection with his proposed tour to the Philippines this year to attend the meeting of the F. A. O. Group on Coconut and Coconut Products for which he has been appointed Liaison Officer by the Government of India. The increase under the other two heads is based on the actuals of the first 4 months of the year.

The total enhanced provision under "Administration" is however of the order of Rs. 5,380 only.

*C. Publicity and Propaganda:* At its 23rd meeting held in 1956 the Committee had decided to print and



publish a monograph on coconut. Although provision for meeting the expenditure in this connection was made in the Budget Estimates and Revised Budget Estimates for 1957-'58, the amount provided could not be spent as the printing had not been completed. As the printing is expected to be completed shortly a provision of Rs. 55,000 is being made in the Revised Budget Estimates for the current year to meet the expenditure under Publicity and Propaganda.

## **II Agricultural Research - A. Research Stations.**

(i) *Central Coconut Research Station, Kasaragod.* Details under this head are given in Annexure III.

(a) *Non-recurring expenditure* (2) *Lay out.* The Joint Director, Central Coconut Research Station, Kasaragod had suggested a provision of Rs. 11,500 in the Revised Budget Estimates for laying out about 36 acres of land in the Hill Block for implementing the recommendations of the Expert Reviewing Committee and for meeting expenditure on the other usual items of work such as forming bunds, cart tracks etc. in the farm. As the former work is proposed to be undertaken as part of II Five-Year Plan only the sanctioned amount of Rs. 4,000 has been retained in the Revised Budget Estimates and the balance included in the provision under that head in the Part II Budget Estimates for 1959-60.

### **4. Stores. (i) Farm implements including carts and vans.**

The provision has been increased by Rs. 1,300 for purchase of water carts and accessories required for watering the coconut seedlings underplanted in various parts of the farm.

### **(ii) Furniture and Office Equipment**

A sum of Rs. 16,600 has been provided in the revised estimates as against only Rs. 3,000 in the sanctioned estimates, in order to meet the cost of furniture for the new Laboratory and Office building, which has recently

been contracted to be made at a cost of Rs. 12,500 and for properly furnishing the Rest House.

**(b) Recurring Expenditure.**

**4. Indian Central Coconut Committee Provident Fund Contribution**

The provision has been increased by Rs. 1,300 over the sanctioned amount to meet the difference in the rate of employee's contribution to the Fund sanctioned by the Committee at its last meeting.

**6. Other Charges. (a) Farm working Expenses.**

With the appointment of regular mazdoors and grant to them of pay, dearness allowance etc., additional funds are required and this accounts for the increase of Rs. 2,700 under "Cultivation Charges" and Rs. 4,500 under "Miscellaneous Expenses".

**7. Scheme for procurement and Supply of Seed Coconuts to States.**

This scheme was worked on a "no-profit, no-loss" basis and the cost of the seednuts was fixed at Rs. 675/- per 1000, in order to meet the cost of the staff employed in the scheme. Some of the States have backed out of the scheme due to the cost of the seednuts being fixed at Rs. 675/- per 1000. A proposal is now before the Sub-Committee to close down the scheme as it is with effect from 30-9-1958 and to continue it on a different basis. The staff under the Scheme will be reduced and utilised for running a coconut nursery under the Committee at a suitable place besides being used for procuring seednuts for the various States as and when necessary. Only the actual cost of the seednuts and incidental expenses will be realised from the States. The provision of Rs. 26,170 now made under this head is to meet the cost of the existing scheme up to 30-9-1958 only.



**II-A. (ii) Central Coconut Research Station, Kayangulam (a) Non-recurring expenditure (3) Buildings Residential and Non-Residential.**

Against the sanctioned amount of Rs. 5,000 a sum of Rs. 10,500/- has been provided in the Revised Budget Estimate for meeting the expenditure for extending street lights to the Southern Block of the farm at a cost of Rs. 5,500/-.

**b) Recurring Expenditure.**

**4. Indian Central Coconut Committee Provident Fund Contribution.**

As in the case of the Committee's Office and the Central Coconut Research Station, Kasaragod, the provision of Rs. 5,000 under this head in the sanctioned budget has been enhanced to Rs. 8,000 to meet the excess contribution payable by the Committee to the subscribers of the Committee's Provident Fund at the enhanced rate of 8½%.

**6. Other Charges. (a) Farm Working Expenses (iv) Miscellaneous Expenses.**

The provision in the Revised Budget Estimate has been increased by Rs. 5,000/- to meet the pay, dearness allowance etc., of the permanent mazdoors at the enhanced rates sanctioned and also the expenditure required in connection with the import of live specimens of *Scolia oryctophaga* from Mauritius.

d) *Office Contingencies.* The enhanced provision of Rs. 15,000 in the Revised Budget Estimates as against Rs. 8,000 in the sanctioned budget is for payment to the Kerala Government of the lease amount of the Station site for 4 years from 1954 and also the property tax due to the Kayangulam Municipality.

**II B. Grant-in-aid Schemes.**

In nearly all the schemes the provisions made in the sanctioned budget have been retained in the Revised Budget Estimate also.

Under the head "III Marketing Schemes (2) Spraying Scheme by 7 Co-operative Unions in Kerala", a provision of Rs. 780 has been made in the Revised Budget Estimate for payment of the Committee's share of loss on account of reduction in spraying charges, to the Co-operative Unions who undertook the spraying work.

*General.* The closing balance in the Part I revised budget is estimated at Rs. 4,70,161 as against Rs. 2,39,135 in the sanctioned budget even though the estimated expenditure according to the revised estimates is of the order of Rs. 7.99 lakhs as against Rs. 6.74 lakhs in the sanctioned budget.

## **Part II (Second Five-Year Plan)**

### **Annexure V.**

*Receipts.* The contribution of the Government of India has been shown as Rs. 5,11,674.75 in the Revised Budget Estimate as against Rs. 5,41,674.75 as the Government of India have ordered a cut of Rs. 30,000 in the grant made by them.

### **Expenditure.**

I. *Administration.* Details of the sum of Rs. 22,865 provided in the revised estimates are contained in Annexure VI. The increase of Rs. 495/- under dearness allowance is for meeting the special dearness allowance sanctioned to the staff last year and of Rs. 670/- under Provident Fund contribution for the purpose mentioned against the same head in the Part I Estimates. Besides, a provision of Rs. 200/- has been made for meeting the travelling allowance of the staff appointed under the Plan Scheme.

## **II Agricultural Research - A. Research Stations.**

(i) Central Coconut Research Station, Kasaragod (For details please see Annexure VII).

2. *Layout.* The sanctioned provision of Rs. 12,000 under this head has been reduced to Rs. 4,000 as the land



proposed to be acquired may be taken possession of only towards the last quarter of the year and it may not be possible to spend more than Rs. 4,000 on layout.

### **3. Buildings-Residential and Non-Residential.**

The Joint Director had suggested a provision of Rs. 94,200 under this head for construction of (1) a garage to house the jeep and Station Waggon purchased under the plan scheme and (2) the hostel for trainees and for payment to the Central Public Works Department the additional advance required for construction of a glass house.

In view of the cut of Rs. 30,000 made by the Government of India in the grant to be paid to the Committee this year and the necessity of finding funds for starting the technological schemes sanctioned by the Committee at its last meeting this year itself, it was decided to postpone construction of the Hostel at the Central Coconut Research Station, Kasaragod to next year. Accordingly a provision of Rs. 16,200 only has been made in the Revised Budget Estimate for the other two items mentioned above.

### **4. Stores (i) Farm Implements including carts and vans.**

The provision of Rs. 2,000 under this head is for meeting the railway freight and other charges on the Station Waggon recently purchased.

(iii) *Laboratory Equipment.* As the Chemical Engineer to be in charge of the technological scheme at the Station is not likely to be appointed before 1-11-1958 and the pilot plant to be purchased at an estimated cost of Rs. 30,000/- for the technology section cannot be purchased and installed before the close of the current year after going through all the necessary formalities, a reduced provision of Rs. 7,600 only is made in the Revised Budget Estimate as against Rs. 32,500 in the Budget Estimate for purchase of certain minor equipment.

**b) Recurring Expenditure: 2. Allowances and Honoraria.**

(i) *Dearness allowance.* The provision in the Revised Budget Estimate has been enhanced by Rs. 2,600/- to enable payment of the special dearness allowance sanctioned to the staff last year.

(iii) *Other Compensatory allowance including medical attendance.* A sum of Rs. 600/- has been provided for reimbursement of medical expenses to the Officers and staff appointed and to be appointed under the II Plan.

3. *Petty Construction and Repairs:* Rs. 2,000/- has been provided for meeting expenditure on petty construction and repairs work to be undertaken under the Scheme.

4. *Provident Fund Contribution.* The reasons given for the enhancement of provision under the same head in respect of the Committee's office and the two Central Coconut Research Stations, in the Revised Budget Estimate (Part I) hold good in this case also.

5. *Other Charges.* The provision for office contingencies under this head has been increased by Rs. 1,700 to meet any unexpected items of expenditure.

(ii) *Central Coconut Research Station, Kayangulam.* (For details see Annexure VIII).

(a) *Non-recurring expenditure.* 2. *Layout.* The acquisition of additional lands required for the Station is expected to be completed in the course of the year. For providing barbed wire fencing and for forming cross roads and bunds in the newly acquired area a provision of Rs. 3,000 has been made in the Revised Budget Estimate, since no provision exists under this head in the sanctioned budget.

**3. Buildings—Residential and Non-Residential etc.,**

In the sanctioned Part II budget for 1958-59 a sum of Rs. 12,168/- had been provided under this head. This was originally intended for the Pot Culture House and



Insectory. But as this amount was remitted last year itself by diversion from the Kasaragod Station budget of that year, the whole amount is not required for the purpose this year. But a sum of Rs. 662/- is required for payment to the Central Public Works Department towards balance for the construction of the Pot Culture House and Insectory and therefore the original provision has been reduced to Rs. 3,662/-.

**b) Recurring expenditure. 2. Allowances and Honoraria. (i) Dearness Allowance.**

For the reasons stated in the Budget of the Kasaragod Station, the provision in the Revised Budget Estimate has been increased by Rs. 1,300/-.

**4. Indian Central Coconut Committee Provident Fund Contribution.**

As in the case of the Kasaragod Station budget, the increase in provision under this head in the Revised Budget Estimate of this Station is Rs. 750/- only.

**II B. Grant-in-aid Scheme, III Market and Economical Surveys and IV Scheme for the Control of Coconut Pests.**

The provisions made in the Revised Budget Estimate for payment of grants to the various states for most of the schemes coming under the above two heads are in almost all cases very much below those made in the sanctioned budget and are either based on revised estimates received from the State Governments or where no such estimates have been received, on the original estimates but calculated from the actual or probable date of starting of the scheme.

Under 'Compilation and Analysis of data' the provision of Rs. 18,634/- in the sanctioned budget has been increased to Rs. 28,920/- to meet the cost of Duplicating and Calculating machines, typewriters etc., which had not been provided for in the original estimates.

For the 'Enquiry into the cost of cultivation of coconuts in Kerala' and for the "Scheme for the revision of the report on the marketing of coconuts in India", the provisions made in the Revised Budget Estimates are Rs. 25,500 and Rs. 16,300 respectively.

#### IV (b) Scheme for the control of Anabe roga of Coconut in Mysore.

The Committee, at its last meeting, had approved of this Scheme and decided that it might be financed from savings under the Second Five-Year Plan. The Government of India's sanction for the purpose has been sought and is awaited. The Committee's share of expenditure on this scheme for the current year is estimated at Rs. 6,445/- and, therefore, this amount has been provided in the Revised Budget Estimate.

#### V. Technological Schemes.

The Technological Sub-Committee of the Indian Central Coconut Committee had, at its last meeting, approved of schemes for the solvent extraction of oil from the cake and preparation of activated charcoal at the Regional Research Laboratory at Hyderabad as also a scheme for the preparation of Vinegar etc., at the Central Food Technological Research Institute, Mysore. The financial implications of the schemes have been placed before the Finance Sub-Committee at its present meeting for approval. The Schemes, after being got approved by the Government of India, are expected to start only by the 1st December 1958 at the earliest. Based on this assumption necessary provisions have been made in the Revised Budget Estimate.

*General:* The total expenditure on the II Plan Schemes for the current year has been limited to Rs. 5.76 lakhs as desired by the Government of India and therefore no new Schemes other than these already included can be taken up this year.

In the light of the decisions that may be taken at this meeting, the Part I Revised Budget Estimate for 1958-59 may have to be revised before submission to the



Government of India. The Sub-Committee may, therefore, authorise the Secretary to make the necessary revision in the Part I Revised Budget Estimate in the light of decisions taken by the Sub-Committee.

In this connection the Sub-Committee may also consider the following point:—

It has been the practice to prepare and submit the Revised Budget Estimate of a particular year for the approval of the Committee along with the Budget Estimates of the following year as early as September-October in the year and to submit them for the approval of the Government of India soon after. But the Government of India communicates their approval only towards the fag end of the financial year and at times in the beginning of the succeeding year. This late Communication of sanction by the Government of India to the Committee's Revised Budget Estimates defeats the very purpose for which the revised estimates are framed, for it makes it practically impossible to meet any expenditure out of the Revised Budget Estimates during the concerned financial year. This results in the enhanced provisions getting lapsed and because the provisions in the budget estimates of the succeeding year do not include the enhanced amounts of the preceding year, the purpose for which the enhanced amounts were provided in the Revised Budget Estimates is not possible of fulfilment even in the succeeding year.

As there is provision under the Rules of the Committee for getting supplementary grants sanctioned by the Government of India, it is suggested that the practice of preparing and submitting revised budgets may, with the approval of the Government of India, be discontinued in future and wherever additional amounts are required under any particular head of expenditure, supplementary grants may be applied for which the Government of India may be requested to sanction expeditiously.

The Revised Budget Estimate for 1958-59 may now be considered by the Finance Sub-Committee.

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# ANNEXURE I.

## Indian Central Coconut Committee, Revised Budget Estimates for 1958-59 (Part I)

### Receipts

Particulars	Actuals 1957-58		Sanctioned Revised Budget for Estimates 1958-59 for 58-59		Particulars	Actuals 1957-58		Sanctioned Revised Budget for Estimates 1958-59 for 58-59	
	Rs.	nP.	Rs.	Rs.		Rs.	nP.	Rs.	Rs.
Opening balance	2,37,904	46	1,34,165	3,95,236	I. A. (i) Ad- ministration	1,21,845	16	1,33,900	1,39,280
Coconut Cess	6,37,372	14	7,00,000	7,00,000	B.T.A. of Non- official mem- bers	8,956	84	10,000	10,000
Other Receipts					C. Publicity and Propaganda	33,155	83	45,000	1,00,000
Receipts from publications	7,769	91	8,000	21,000	II. Agricultural Research				
Miscellaneous Receipts	7,767	25	200	50,200	A. Research Stations.				
Receipts from:-					(i) C.C.R.S. Kasaragod				
(1) C.C.R.S. Kasaragod					(a) Non-recurring				
(i) Farm Produce etc.	60,270	73	50,500	59,300	Expenditure	22,346	31	21,400	35,900



Receipts			Expenditure		
Particulars	Actuals 1957-58	Sanctioned Revised Budget for Estimates 1958-59 for 58-59	Particulars	Actuals 1957-58	Sanctioned Revised Budget for Estimates 1958-59 for 58-59
(ii) Receipts from the Scheme for Procurement and supply of seed-coconuts to States	3,346 50	—	(b) Recurring Expenditure C.C.R.S. Kayangulam	1,52,158 70	1,76,580 2,04,920
(2) C.C.R.S. Kayangulam			(a) Non-recurring Expenditure	11,111 44	20,000 25,500
(i) Farm Produce etc.	20,218 73	20,950	(b) Recurring Expenditure	1,55,824 40	1,66,350 1,79,500
(ii) Receipts from scheme for the control of leaf disease of coconuts	600 37	—	(c) Scheme for the control of leaf disease of coconuts	1,617 70	—
(iii) Receipts from I.C.A.R. for I.C.A.R. schemes	5,000 00	—	B. Grant-in-aid Schemes		
			(a) Research schemes Regional Coconut Research Station, in:		
			1) Travancore (Kerala)	26,000 00	23,625 23,625
	9,80,250 09	9,13,815 12,69,660			

2) Andhra	4,550 00	5,400	5,400
3) Bombay	11,660 00	11,840	11,840
4) Orissa	—	—	—
5) Assam	—	9,000	9,000
(b) Coconut Nurseries			
(i) Madras Com- prehensive (Pattukottai)	675 00	—	—
(ii) Irinjalakuda	—	—	—
(iii) Kumta(Mysore)	—	—	—
(iv) Assam	—	—	—
(v) Orissa (Com- prehensive)	1,950 00	2,000	2,000
(vi) Hebbal (Mysore)	—	—	—
(vii) Nandgaon - Bombay	—	—	—
(viii) West Bengal - Chandernagore	4,240	4,275	4,275
(ix) Scheme for the expansion of Coconut Nur- series in T. C. State	1,675 00	6,775	6,775
(x) Andhra Com- prehensive	—	—	—



Receipts			Expenditure		
Particulars	Actuals 1957-58	Sanctioned Revised Budget for Estimates 1958-59 for 58-59	Particulars	Actuals 1957-58	Sanctioned Revised Budget for Estimates 1958-59 for 58-59
			(xi) Ollukkara	1,155 00	685
			(xii) Cooch-Behar	2,120 00	2,690
			(xiii) Wadakkan- cherry	2,080 00	1,470
			(xiv) Coconut Nur- series in Kerala NES Blocks	—	7,785
			(xv) Assam, 2 additional nurseries	—	10,690
			(xvi) Nileswar, Tikkoti	3,530 00	—
			C. Miscellaneous		
			1. Scheme for the establishment of Zonal Parasite Breeding Stations for biological con- trol of <i>Nepthantis</i> <i>serinopa</i>		
			(i) Kasaragod	3,700 00	1,345
					2,170

(ii) Razole, Andhra State	—	—	—
(iii) Travancore-Cochin	3,000 00	6,850	6,654
(iv) Tirunelveli, Madras State	—	—	—
2. Scheme for the Development of Coconut cultivation in Andamans	—	—	—
3. Scheme for the development of coconut cultivation in West Bengal	—	—	—
4. Crop competition for coconut in Kerala	—	—	—
5. Scheme for maintenance of representative varieties of coconuts in Assam	—	510	510



# Expenditure

Particulars	Actuals	Sanctioned Revised		Particulars	Actuals	Sanctioned Revised	
	1957-58	Rs. nP.	Rs.		1957-58	Rs. nP.	Rs.
		Rs.	Rs.	6. Scheme for the investigation of <i>band</i> disease of coconut palms in Bombay State	7,633 00	8,050	8,050
				III. Marketing Schemes			
				(1) Badagara Kiln	2,165 00	—	—
				(2) Spraying scheme by 7 Co-operative Unions in Kerala	—	—	780
				IV. Re-payment of Government of India Loan	24.14	—	—
				Total	5,83,173 52	6,74,680	7,99,499
				Closing Balance	3,97,076 57	2,39,135	4,70,161
					9,80,250 09	9,13,815	12,69,660

## ANNEXURE II

### Revised Budget Estimates 1958-59.

#### I. A. Administration.

Head of Expenditure.	Actuals 1957-58.		Sanctioned Budget for 1958-59.	Revised Estimates for 1958-59
	Rs.	nP.	Rs.	Rs.
<b>1) Pay of Officers</b>				
Secretary	14,298	39	15,270	15,280
<b>2) Pay of Establish- ment.</b>				
(a) Class III Staff	34,515	24	41,020	37,200
(b) Class IV Staff	4,148	21	4,620	4,510
<b>3) Leave Salary &amp; Pension Contri- bution</b>	6,004	03	6,100	5,950
<b>4) Indian Central Coconut Commit- tee Provident Fund Contributions</b>	5,000	01	5,000	7,000
<b>5) Allowances &amp; Honoraria</b>				
(a) Travelling Allowance	7,271	89	9,000	13,000
(b) Dearness Allowance	23,755	98	26,420	26,630
(c) House Rent Allowance	2,047	84	2,570	2,310
(d) Medical Attendance	1,040	56	2,000	2,000
<b>6) Contingencies</b>				
(a) Rent and Accommodation	3,083	72	3,000	3,500
(b) Postage, Tele- grams & Telephone	5,673	17	5,000	6,000



Head of Expenditure.	Actuals 1957-58.		Sanctioned Budget for 1958-59	Revised Estimates for 1958-59
(c) Books and Publications	744	27	500	500.
(d) Stationery and Forms	3,663	84	3,000	3,500
(e) Printing	4,754	55	2,500	2,500
(f) Office Contingencies	3,833	77	3,500	4,000
(g) Furniture and Office Equipments	2,009	69	2,000	3,000
(h) Audit Fee	—	—	2,400	2,400
Total	1,21,845	16	1,33,900	1,39,280

### ANNEXURE III

#### Central Coconut Research Station, Kasaragod - Revised Budget Estimates for 1958-59 (Part I) 2 (c) (i) Receipts.

Particulars	Actuals 1957-58	Sanctioned Budget 1958-59	Revised Estimates 1958-59
	Rs. nP.	Rs.	Rs.
To Farm Produce etc.	60,270 73	50,500	59,300
Receipts from the Scheme for procurement and supply of seed coconuts to States	3,346 50		22,824

#### II A (i) Expenditure.

##### (a) Non-Recurring Expenditure

1. Cost of Land	1,676 12		
2. Layout	103 37	4,000	4,000
3. Buildings - Residential & Non-Residential	14,503 57	2,000	2,000
4. Stores			
(i) Farm implements including carts and van	145 62	1,200	2,500
(ii) Furniture and office equipment	664 71	3,000	16,600
(iii) Laboratory equipment	5,184 42	9,000	9,000
(iv) Meteorological observatory	68 50	200	500



Particulars	Actuals 1957-58		Sanctioned Budget 1958-59		Revised Estimates 1958-59	
	Rs.	nP.	Rs.	nP.	Rs.	Rs.
(v) Photographic Equipment	—	—	6,063	25	14,400	28,900
5. Livestock	—	—	—	—	1,000	1,000
			22,346	31	21,400	35,900
(b) Recurring Expenditure						
1. Pay of Officers and Staff			59,313	72	70,380	64,300
2. Allowances and Honoraria						
(i) Dearness allowance	26,415	94	28,900		29,270	
(ii) Other compensatory allowance including medical attendance	21	00				
(iii) Travelling allowance	4,669	00	1,000		1,000	
(iv) Honoraria	—	—	4,000		6,000	
3. Leave salary and pension contribution			100		100	36,370
4. Indian Central Coconut Committee Provident Fund contribution			31,105	94	34,000	
5. Petty Construction and repairs			1,688	37	2,000	2,000
6. Other Charges			3,556	00	4,200	5,500
(a) Farm Working expenses			9,432	92	6,300	5,800
(i) Cultivation charges	7,574	96	9,500			12,000

(ii) Manures and chemicals	7,310 95	11,000	11,000	
(iii) Maintenance of cattle	3,805 15	4,800	4,800	
(iv) Miscellaneous expenses	17,257 78	<u>18,000</u>	20,300	47,800
(b) Apparatus and materials	—			6,000
(c) Library books and periodicals				3,000
(d) Office contingencies				7,980
7. Scheme for procurement and supply of seed coconuts to States	—	<u>1,52,158 70</u>	—	<u>26,170</u>
			<u>1,76,580</u>	<u>2,04,920</u>



# ANNEXURE IV

## Central Coconut Research Station, Kayangulam-Revised Budget Estimates for 1958-59 (Part I) 2 (c) (ii) Receipts

Particulars	Actuals 1957-58		Sanctioned Budget 1958-59		Revised Estimates 1958-59	
	Rs.	nP.	Rs.	nP.	Rs.	Rs.
1. Farm Produce etc.						
2. Receipts from the Scheme for the control of leaf disease of coconuts.			20,218	73	20,950	21,100
			600	37		

### II. A (ii) Expenditure.

#### (a) Non-Recurring Expenditure

1. Cost of land			500	50	2,000	2,000
2. Layout						
3. Buildings-Residential and Non-Residential			4	58	5,000	10,500
4. Stores						
(i) Farm implements including carts & van	530	72			2,500	2,500
(ii) Furniture and office equipments						
(iii) Laboratory equipments	4,765	52			2,500	2,500
(iv) Meteorological observatory	2,472	45			5,000	5,000
(v) Photographic equipment	403	72			1,000	1,000
	2,433	95	10,606	36	13,000	13,000
			11,114	41	20,000	25,500

<b>(b) Recurring Expenditure</b>					
1. Pay of Officers and Staff		67,386	78	75,700	71,400
2. Allowances and Honoraria	26,763	18		28,600	
(i) Dearness allowance					
(ii) Other compensatory allowance including medical attendance	15	03		1,000	
(iii) Travelling allowance	5,550	28		5,000	
(iv) Honoraria	—		32,328	49	36,100
3. Leave Salary and Pension contribution			1,704	66	2,000
4. Indian Central Coconut Committee Provident Fund contribution			4,611	00	8,000
5. Petty construction and repairs			5,663	68	6,000
6. Other Charges					
(a) Farm working expenses					
(i) Cultivation charges	6,499	49		8,000	
(ii) Manures & chemicals	9,245	34		10,000	
(iii) Maintenance of cattle	—			—	
(iv) Miscellaneous expenses	14,776	48	30,521	31	33,000
(b) Apparatus and materials			4,999	53	5,000



Particulars	Actuals 1957-58	Sanctioned Budget 1958-59	Revised Estimates 1958-59
(c) Library books and periodicals	2,828	72	3,000
(d) Office Contingencies	5,780	23	15,000
	<u>1,55,824</u>	<u>40</u>	<u>1,79,500</u>
7. Scheme for the control of leaf disease of coconuts	1,617	70	

# ANNEXURE V

## Indian Central Coconut Committee - Revised Budget Estimates For 1958-59 (Part II) (Second Five-Year Plan)

Receipts				Expenditure			
Particulars	Actuals 1957-58	Sanctioned Budget 1958-59	Revised Estimates 1958-59	Particulars	Actuals 1957-58	Sanctioned Budget 1958-59	Revised Estimates 1958-59
	Rs. nP.	Rs. nP.	Rs. nP.		Rs. nP.	Rs.	Rs.
Opening Balance	86,911 62	64,325 25	64,325 25	I. Admini- stration	15,760 75	21,680	22,865
Contribution from the Cen- tral Govern- ment towards cost of Re- search Schemes under the 2nd Five-Year Plan	2,79,165 94	5,41,674 75	5,11,674 75	II. Agricultural Research			
				A. Research Stations			
				(i) C. C. R. S., Kasaragod			
Amount trans- ferred from Coconut Im- provement Fund Account	9, 69			(a) Non-Re- curring Ex- penditure	52,874 00	75,750	61,350
				(b) Recurring Expenditure	3,945 44	73,220	75,760



## Expenditure

— 120 —

Rs. nP.	Rs. nP.	Rs. nP. III.	Marketing and Economic Surveys
		(i)	Pilot Schemes for the correct estimation of area and yield of Coconuts & assessment of results of 2nd Five-Year Plan in -
		1)	Kerala
		2)	Madras
		3)	Mysore
		4)	Andhra
		5)	Bombay
		6)	Orissa
		7)	West Bengal
		8)	Assam
		(ii)	Compilation and Analysis of data
			24,850
			15,800
			22,704
			16,767
			17,820
			15,734
			18,154
			10,000
			7,000
			10,000
			7,000
			7,840
			7,000
			—
			10,000
			27,489
			18,634
			28,920
			3,67,087
			25 6,06,000 00 5,76,000 00





Rs. nP.	Rs. nP.	Rs. nP.	2) Andhra - Non-Recurring Expenditure	10,997
			Recurring Expenditure	18,100
			3) Bombay - Non-Recurring Expenditure	4,550
			Recurring Expenditure	15,100
			4) Kozhikode - Non-Recurring Expenditure	500
			Recurring Expenditure	1,000
			b) Scheme for the control of Anabe roga of coconut in Mysore	3,850
			V. Technological Schemes	4,000
			i) Scheme for solvent extraction	6,445
<u>3,67,087 25 6,06,000 00 5,76,000 00</u>				





Rs. nP.	Rs. nP.	Rs. nP. iii)	Scheme for pre- paration of vinegar etc., at the Central Food Techno- logical Research Institute, Mysore	5,260
		Total	1,35,684 38 6,05,640	5,76,000
		Refund to Govern- ment of India	1,67,077 62	
		Closing balance	64,325 25 360	nil
		Total	3,67,087 25 6,06,000	5,76,000
			<u>3,67,087 25 6,06,000 00</u>	<u>5,76,000 00</u>



**ANNEXURE VI**  
**Revised Budget Estimates 1958-59.**  
**Administration (Part II).**

Particulars	Actuals 1957-58.	Sanctioned Budget for 1958-59.	Revised Estimates for 1958-59
	Rs. nP.	Rs.	Rs.
1. Pay of Class III Staff	7,212 79	10,122	10,050
2. Pay of Class IV Staff	662 61	1,156	1,090
3. Dearness Allowance	6,396 97	8,240	8,735
4. House Rent Allowance	821 38	1,132	1,090
5. Provident Fund Con- tribution	667 00	1,030	1,700
6. Travelling Allowance	—	—	200
Total	15,760 75	21,680	22,865

# ANNEXURE VII.

## II A (i) Central Coconut Research Station Kasaragod - Revised Budget Estimates for 1958-59 (Part II).

Particulars	Actuals 1957-58	Sanctioned Budget 1958-59	Revised Estimates 1958-59
(a) Non-Recurring Expenditure			
1. Cost of Land		30,000	30,000
2. Layout		12,000	4,000
3. Buildings - Residential and Non-Residential	45,910 00		16,200
4. Stores			
(i) Farm implements including carts and vans	1,612 65		2,000
(ii) Furniture and office equipments	3,227 25	1,250	1,550
(iii) Laboratory Equipments	2,124 10	32,500	7,600
		<u>33,750</u>	<u>11,150</u>
		<u>52,874 00</u>	<u>61,350</u>
(b) Recurring Expenditure			
1. Pay of officers and staff		32,590	31,440
2. Allowances and Honoraria			
(i) Dearness Allowance	1,542 46	15,120	17,720
(ii) Travelling Allowance		2,400	3,000



Particulars	Actuals 1957-58	Sanctioned Budget 1958-59	Revised Estimates 1958-59
(iii) Other compensatory allowance including Medical Attendance	—	17,520	21,320
(iv) Honoraria	—	—	2,000
3. Petty Construction & Repairs	1,542 46	600	3,700
4. Provident Fund Contribution	154 00	2,510	
5. Other Charges			
(a) Farm Working expenses		5,000	
(b) Apparatus and Chemicals	20 47	12,500	12,500
(c) Library Books and Periodicals		2,000	
(d) Office Contingencies	5 50	1,100	2,800
	25 97	20,600	17,300
	<u>3,945 44</u>	<u>73,220</u>	<u>75,760</u>
			<u>128</u>

# ANNEXURE VIII

## II. (a) (ii) Central Coconut Research Station, Kayangulam-Revised Budget Estimates For 1958-59 (Part II)

Particulars	Actuals 1957-58		Sanctioned Budget 1958-59		Revised Estimates 1958-59	
	Rs.	nP.	Rs.	nP.	Rs.	Rs.
<b>(a) Non-Recurring Expenditure</b>						
1. Cost of Land			40,000		40,000	40,000
2. Layout						3,000
3. Buildings - Residential and Non-Residential	15,073	00	12,168		3,662	3,662
<b>4. Stores</b>						
(i) Farm implements including Carts and Vans			15,000		500	15,500
(ii) Laboratory Equipments	496	03	15,000		15,000	15,500
(iii) Photographic Equipments	4,858	36	<u>67,168</u>		<u>67,168</u>	<u>62,162</u>
<b>(b) Recurring Expenditure</b>						
1. Pay of officers and staff			33,550			32,100
2. Allowances and Honoraria			21,000		22,300	
(i) Dearness Allowance	2,009	96				



Particulars	Actuals 1957-58	Sanctioned Budget 1958-59	Revised Estimates 1958-59
(ii) Other compensatory allowance including Medical Attendance		1,000	1,000
(iii) Travelling allowance	2,009 96	4,000	4,000
3. Other charges	5,387 17		
4. Indian Central Coconut Committee Provident Fund Contribution			
	140 00	26,000	27,300
	<u>10,384 80</u>	28,250	28,250
		<u>2,750</u>	<u>3,500</u>
		<u>90,550</u>	<u>91,150</u>
			<u>130</u>

**Subject No. 2. Budget Estimates of the Committee for the Year 1959-60 (Parts I & II)**

The Budget Estimates of the Indian Central Coconut Committee for the Year 1959-60 (Parts I & II) are attached to this note (Annexures I to VIII). The salient features of the estimates are indicated below:-

**Budget Estimates for 1959-60 (Part I)**

**Receipts:**

*Opening Balance:* The opening balance of Rs. 4,70,161 represents the closing balance in the Revised Budget Estimates for 1958-59.

*Copra Cess:* The Government of India have not so far intimated to the Committee what amount they propose to allot to this Committee during the Year 1959-60 by way of collections from the copra cess. Based on the amounts received in the previous two years under this head, a provision of Rs. 7/- lakhs is, however, made.

*Receipts from publications:* The receipts from publications in 1959-60 are estimated at Rs. 33,000 as against Rs. 21,000 during the current year as there will be sale of copies of the publication "The Coconut Palm - A Monograph".

**Expenditure**

*I. A. Administration:* (For details please see Annexure II)

The slightly increased provisions made in the Budget Estimates under Pay of Officers and establishment, leave salary and pension contribution and dearness and house rent allowances are on account of the annual increments to be drawn by the staff during the year and for meeting the pay and allowances etc., of the staff to be appointed shortly to a few vacant posts.

6. *Contingencies:* The provisions made under four of the items under this head are the same as those made in the Revised Budget Estimates for 1958-59; in three cases slightly higher, and under 'Audit fees' (item h) a sum of Rs.6,810 has been provided to pay the arrears of audit fee due to the Comptroller, Kerala for conducting the



audit of the accounts of the Committee, including the fee due for the audit to be taken up during the current year also.

### **I. C. Publicity and Propaganda**

Besides the monthly Bulletin, the quarterly Journal and other pamphlets, the Bengali edition of the Hand Book on Coconut Cultivation, the third revised edition of the Hand Book in Malayalam and some posters are proposed to be brought out during the year 1959-60. A provision of Rs.60,000 has been made under this head for the normal activities connected with publicity and propaganda and for these special items.

*II Agricultural Research. A. Research Stations:*  
(Please see Annexures III & IV)

#### **1) Central Coconut Research Station, Kasaragod**

##### **a) Non-Recurring Expenditure-Layout**

##### **2) Layout**

The provision of Rs. 11,500 is for meeting expenditure connected with forming bunds, cart tracks etc., and for lay out of 36 acres of land in the Hill Block.

##### **3) Buildings – residential and non-residential etc.**

The Joint Director had suggested a provision of Rs. 79,600 under this head for the construction of quarters for himself, the Farm Assistant and watchmen. As provision for construction of Staff quarters for the Committee's staff in the headquarters office as well as at the two Central Coconut Research Stations has been included in the III Five-Year Plan scheme forwarded to the Government of India, a sum of Rs. 10,000 is provided in the Budget Estimate of 1959-60 for construction of quarters for such of the Class IV Staff or class III Staff whose stay within the premises of the Station is considered absolutely necessary.

4. *Stores.* The provisions made for the different items under this head are either the same as those made in the Revised Budget Estimates for 1958-59 or even

lower, except in the case of photographic equipment for which a higher provision of Rs. 800 has been made.

**b) Recurring Expenditure.**

**1. Pay of Officers and Staff**

**2. i) Dearness Allowance**

The enhanced provisions of Rs. 73,500 and Rs. 32,610 under the above two heads respectively for the year 1959-60 as against Rs. 64,300 and Rs. 29,270 only in the Revised Budget Estimates are necessary for payment of salary and allowances of the existing staff taking into account the increments due to them next year and of the staff that is proposed to be appointed in the latter half of the current year and which will continue next year.

**6. Other charges (a) Farm working expenses.**

**1) Cultivation charges**

With the appointment of regular mazdoors and the grant to them of pay, dearness allowance etc., additional funds are needed and enhanced provision has been made accordingly under this item of expenditure.

b) *Apparatus and materials.* Though the Joint Director wanted Rs. 12,250/- to be provided under this head for purchase among other things of apparatus and materials required for implementing the recommendations of the Reviewing Committee also a provision of Rs. 8000/- only has been made under Part I of the Budget and the balance being provided in the Part II Budget for 1959-60.

**II A. (ii) Central Coconut Research Station,  
Kayangulam**

(a) *Non-recurring expenditure – 3. Buildings-Residential and non-residential.* The Director had asked for Rs. 42,000 being provided under this head for construction of three staff quarters for Class III employees of his Station. As provision for staff quarters for the Committee's employees has been included in the III Five



Year Plan Scheme forwarded to the Government of India, a token provision of Rs. 10,000 only is made in this Budget to enable quarters being provided to some more members of the Class IV staff of the Station.

#### **4. Stores (1) Farm implements including carts and vans**

A provision of Rs. 1,22,000 was suggested by the Director to meet among other things the cost of making cement concrete tubs, flower pots, potculture equipments etc., required for implementing the Reviewing Committee's recommendations. It was, however, decided in consultation with him to transfer a sum of Rs. 1,20,000 to the Part II Budget of the next year and to provide in the Part I Budget, a sum of Rs. 2,000 only. Necessary provisions have accordingly been made.

(iii) *Laboratory equipments.* For the reasons stated in the foregoing paragraph, the provision of Rs. 60,275 suggested to be made in the Part I Budget of 1958-59 has been reduced to Rs. 25,275 and the balance included in the Part II Budget of that year.

#### **(b) Recurring Expenditure**

(1) *Pay of Officers and staff and* (2) (i) *Dearness allowance.* The slightly increased provisions under these heads are on account of the grant to the officers and staff of their annual increments in pay that would fall due next year.

#### **5) Petty Construction and Repairs**

The provision of Rs. 8,000 is for the annual maintenance of both residential and non-residential buildings and also for a few other buildings expected to be constructed during the current year.

#### **6) Other charges (a) Farm Working Expenses**

Manuring, intercultivation etc. of the additional lands proposed to be laid out in the Hill Block may have to be taken up next year. Besides, additional funds may be necessary in connection with the import of *Scolia oryctophagae* from foreign countries. This accounts for

the slightly increased provisions made under the various items coming under the above head.

b) *Apparatus and Materials*. An amount of Rs. 35,000 was suggested to be provided under this head to meet, among other things, expenditure on the cost of apparatus and materials required for implementing the Reviewing Committee's recommendations. But a sum of Rs. 5,000 only has been provided in this Budget and the balance included under "Other Charges" in the Part II Budget of 1959-60.

## **B. Grant-in-aid schemes and C. Miscellaneous.**

The provisions made for all the schemes coming under these two heads, excepting those for the scheme for expansion of coconut nurseries in Travancore-Cochin State (Item (b) (ix) and coconut nurseries in N. E. S. Blocks (Item b) (xiv) are based on estimates received from the State Governments.

Regarding the scheme for expansion of coconut nurseries in Travancore-Cochin State (Item b) (ix) referred to above, a sum of Rs. 68,000 has been provided which includes in addition to the current year's grant of Rs. 5,403 a sum of Rs. 62,753 being the arrears due by the Committee to the Kerala Government towards the scheme as per the grant-in-aid statement for the year 1955-56.

As regards the coconut nurseries started in the N.E.S. Blocks (Item b xiv) referred to above, the provision of Rs. 7,785 made in the Revised Budget Estimates for 1958-59 is for meeting the Committee's subsidy for 9 nurseries started already. In 1958-59, however, 18 nurseries are expected to be in operation. The grant for these nurseries will become payable only in 1959-60 and therefore Rs. 15,570 has been provided for the purpose in this Budget.

*Closing Balance:—* Though the total expenditure during the year 1959-60 is estimated at Rs. 8,19,283 as against Rs. 7,99,499 during the current year, the anticipated closing balance in both the years is of the order of Rs. 4.70 lakhs (round).



## Part II – Second Five-Year Plan Annexure V

*Receipts.* – The Government of India have not yet intimated the amount of the grant that they have allotted to this Committee in 1959-60 for working the Second Five-Year Plan Schemes. The estimated expenditure for the year 1959-60 being of the order of Rs. 11,69,791 an equal amount has been shown as receipts by way of grant that could be expected from the Government of India. This amount is more than double the grant payable by them during the current year.

### Expenditure

I. *Administration:*— From the details furnished in Annexure VI, it will be seen that there is a slight increase in the provisions made under the heads “Pay of Class III and IV Staff” and “Dearness and House Rent allowances”. The increase is due to the provision of increments falling due to the staff during the year 1959-60.

### II. Agricultural Research – A. Research Stations

(i) *Central Coconut Research Station, Kasaragod* (Annexure VII).

(a) *Non-recurring Expenditure:*—

2. *Lay out:*— The enhanced provision of Rs. 15,500 in the Budget Estimates for 1959-60 as against Rs. 4,000 only in the Revised Budget Estimates is for implementing the Reviewing Committee’s recommendations.

3. *Buildings – Residential and Non-residential:*— The sum of Rs. 78,000 provided under this head is for construction of a hostel for trainees at the Station.

4. *Stores (i) Farm implements including carts and vans:*— The provision of Rs. 15,700 includes the cost of a tractor and accessories proposed to be purchased during the coming year.

(iii) *Laboratory equipments:*— For implementing the recommendations of the Expert Reviewing Committee new items of laboratory equipments have to be acquired. Besides, equipments required for coconut

technology work, soil survey work etc., have also to be purchased. A provision of Rs. 1,17,400 has accordingly been made.

(b) *Recurring expenditure* – 1. *Pay of officers and staff* and (2) *Allowances and honoraria*:— Necessary provision has been made for payment of salary and allowances of the staff now in position and for those to be appointed in the course of the current year.

5. *Other charges* (b) *Apparatus and Chemicals*: For meeting the cost of materials required for implementing the Reviewing Committee's recommendations and for other works contemplated under the Plan scheme, Rs. 32,950 has been provided.

II. (a) (ii) *Central Coconut Research Station, Kayangulam* (vide Annexure VIII).

a) *Non-recurring expenditure* – 3. *Buildings – residential and non-residential*:— A sum of Rs. 10,500 has been provided under this head for the construction of a garage for the van ordered to be purchased under the II Five-Year Plan and for payment of any additional advance that may have to be made to the C. P. W. D. in connection with the construction of the Insect Proof Green House.

#### 4. **Stores** (i) **Farm implements including carts and vans.**

For implementing certain recommendations of the Expert Reviewing Committee, cement concrete tubs, flower pots etc., are required. The cost of making these is estimated at Rs. 1,20,500. The provision of Rs. 1,20,700 includes this amount.

#### **Laboratory Equipments.**

The provision of Rs. 65,000 includes the expenditure involved in getting down the equipments required in connection with the implementation of the Reviewing Committee's recommendations also.

(iv) *Furniture and office equipment*. To provide adequate facilities for the staff appointed under the Plan Scheme additional furniture like work tables,



almirahs, shelves etc., are necessary. The provision of Rs. 3,300 is for that purpose.

b) *Recurring expenditure* (iii) *Travelling allowance*. With the completion of the appointment of the full compliment of staff under the Plan Scheme the expenditure under travelling allowance is bound to go up. Therefore the provision in the Budget Estimates has been increased to Rs. 5,000 from Rs. 4,000 in the Revised Budget Estimates of this year.

3. *Other Charges*. The sum of Rs. 74,700 includes the cost of apparatus and chemicals, manures required for giving additional doses to the coconut trees under experiment in accordance with the recommendations of the Reviewing Committee and certain other contingent expenditure connected with the Plan Scheme.

#### **B. Grant-in-aid schemes-Regional Coconut Research Stations.**

The increased provisions for the Orissa and Mysore schemes during the year 1959-60 are due to the inclusion of a portion of the grants reduced from the grants due to them in the year 1958-59.

### **III. Marketing and Economic Surveys.**

(i) *Pilot schemes for the correct estimation of area and yield of coconuts*. The provisions made for payment of grants to the various States under this scheme are more in the next year as they represent a full year's grant, while those made in the Revised Budget Estimates of the current year are only for a few months in the latter half of 1958-59.

(ii) *Compilation and analysis of data*. The provision is less during the year 1959-60 than that made in the current year as the former does not include any non-recurring expenditure like duplicator, typewriters, calculating machines etc., for the purchase of which provision has been made in the Revised Budget Estimates of the current year.

(iii) & (iv) *Enquiry into the cost of cultivation of coconuts in Kerala and scheme for the revision of the*

*Report on the Marketing of Coconuts and Coconut Products in India.*

The reason for the enhanced provisions under these heads during the year 1959-60 is the same as that given for the Pilot Schemes for Correct Estimation of area and yield referred to above.

**IV (a) Scheme for the control of coconut pests and  
(b) for control of Anabe roga in Mysore.**

The provisions shown are based on estimates received from the State Governments concerned.

**V. Technological Schemes**

- (i) *Scheme for solvent extraction of oil cake and*
- (ii) *for preparation of activated charcoal.*

The provision under recurring expenditure is more during the year 1959-60 as it represents expenditure for the full year while that during the current year is only from 1-12-1958, the date on which the schemes are expected to start functioning after receiving the approval of the Government of India.

- (iii) *Scheme for preparation of Vinegar etc., at the Central Food Technological Research Institute, Mysore.*

As in the case of the two other technological schemes referred to above, this scheme is also expected to be started only from 1-12-1958 and therefore while a provision of Rs. 5,260 only is made in the Revised Budget Estimates for 1958-59; Rs. 19,995 is provided for the year 1959-60.

The Budget Estimates Parts I and II for 1959-60 are now for the consideration of the Finance Sub-Committee.

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# ANNEXURE I

## Indian Central Coconut Committee – Budget Estimates (Part I) 1959-60

### Receipts

Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60
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	Rs.	nP.	Rs.
--	-----	-----	-----

Opening balance	2,37,904	46	4,70,161
1. Coconut Cess	6,37,372	14	7,00,000

2. Other Receipts			
a) Receipts from publications	7,769	91	33,000

b) Miscellaneous Receipts	7,767	25	50,200
c) Receipts from:-			200

1) C. C. R. S., Kasaragod			
i) Farm Produce etc.	60,270	73	59,300

ii) Receipts from the Scheme for Procurement and Supply of			65,700
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seed coconuts to States	3,346 50	22,824	—	(b) Recurring Expenditure	1,52,158 70	2,04,920	2,00,310
2) C. C. R. S., Kayangulam				(ii) C. C. R. S., Kayangulam			
i) Farm Produce etc.	20,218 73	21,100	20,500	(a) Non-recurring Expenditure	11,111 44	25,500	45,275
ii) Receipts from the Scheme for the control of leaf disease of coconuts	600 37			(b) Recurring Expenditure	1,55,824 40	1,79,500	1,83,400
d) Receipts from Indian Council of Agricultural Research for I.C. A.R. schemes	5,000 00			(c) Scheme for the control of leaf disease of coconuts			
				B. Grant-in-aid Schemes	1,617 70		
				(a) Research Schemes			
				R.C.R.S., in —			
				(1) Travancore (Kerala)	26,000 00	23,625	19,000
				(2) Andhra	4,550 00	5,400	6,819
				(3) Bombay	11,660 00	11,840	7,000
				(4) Orissa	—	—	—
				(5) Assam	—	9,000	—



# Payments

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ix) Scheme for expansion of coconut nurseries in T. C. State	1,675 00	6,775	68,000
x) Andhra, Comprehensive	—	—	—
xi) Ollukkara	1,155 00	685	—
xii) Northern Part of West Bengal	2,120 00	2,690	—
xiii) Wadakkancherry	2,080 00	1,470	777
xiv) Coconut Nurseries in NES Blocks	—	7,785	15,570
xv) Assam, 2 additional nurseries	—	10,690	—
xvi) Nileswhar & Tikkoti	3,530 00	—	—
C. Miscellaneous			
1. Scheme for the establishment of Zonal Parasite			
<hr/>			
	9,80,250 09	12,69,660	12,89,561

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# Payments

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tion in West Bengal	—	—	—
4. Crop Competition for Coconut in Kerala	—	—	—
5. Scheme for maintenance of representative varieties of coconuts in Assam.	—	510	680
6. Scheme for the investigation of band disease of coconut palms in Bombay State	7,633 00	8,050	7,524
III. Marketing Schemes			
i) Badagara Kiln	2,165 00	—	—
ii) Spraying Schemes by Co-operative Unions	—	780	—

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# Receipts

# Payments

Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60	Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60
	R <sup>s</sup> . nP.	R <sup>s</sup> .	R <sup>s</sup> .		R <sup>s</sup> . nP.	R <sup>s</sup> .	R <sup>s</sup> .
				IV. Payment of Government of India loan.	24 14	—	—
					5,83,173 52	7,99,499	8,19,283
				Closing Balance	3,97,076 57	4,70,161	4,70,278
					9,80,250 09	12,69,660	12,89,561

**ANNEXURE II**  
**B. E. 1959 - 60**  
**I. A. Administration**

Head of Expenditure	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60
	Rs. nP.	Rs.	Rs.
1. Pay of Officers:			
Secretary	14,298 39	15,280	15,375
2. Pay of Establishment:			
a) Class III Staff	34,515 24	37,200	41,320
b) Class IV Staff	4,148 21	4,510	4,619
3. Leave Salary and Pension Contribution	6,004 03	5,950	6,153
4. Indian Central Coco- nut Committee, Pro- vident Fund Contri- butions	5,000 01	7,000	6,650
5. Allowances and Honoraria			
a) Travelling Allow- ance	7,271 89	13,000	9,000
b) Dearness Allow- ance	23,755 98	26,630	28,781
c) House Rent Allow- ance	2,047 84	2,310	2,450
d) Medical Attendance	1,040 56	2,000	2,000
6. Contingencies:			
a) Rent and Accom- modation	3,083 72	3,500	4,000
b) Postage, Telegrams and Telephone	5,673 17	6,000	5,500
c) Books and Publi- cations	744 27	500	500
d) Stationery & Forms	3,663 84	3,500	4,000
e) Printing	4,754 55	2,500	3,000
f) Office Contingencies	3,833 77	4,000	4,000
g) Furniture & Office Equipments	2,609 69	3,000	3,000
h) Audit Fee	—	2,400	6,810
Total	1,21,845 16	1,39,280	1,47,158



### ANNEXURE III

#### Central Coconut Research Station, Kasaragod - Budget Estimates (Part I) for 1959-60. 2 (c) (i) Receipts.

Particulars	Actuals 1957-58		Revised Estimates 1958-59		Budget Estimates 1959-60	
	Rs.	nP.	Rs.	nP.	Rs.	Rs.
Farm Produce etc., Receipts from the Scheme for procurement and supply of seed coconuts	60,270	73	59,300		65,700	
	3,346	50	22,824		—	

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#### II A (i) Expenditure.

##### (a) Non-recurring Expenditure

1. Cost of Land	1,676	12	—	—
2. Layout	103	37	4,000	11,500
3. Buildings - Residential & Non-residential etc.	14,503	57	2,000	10,000

##### 4. Stores

(i) Farm implements including carts and vans	145	62	2,500	2,500
(ii) Furniture and office equipment	664	71	16,600	2,500
(iii) Laboratory equipment	5,184	42	9,000	5,000
(iv) Meteorological observatory	68	50	500	500

(v) Photographic Equipment	—	6,063	25	300	28,900	800	11,300
5. Livestock	—	—	—	—	1,000	—	—
		<u>22,346</u>	<u>31</u>		<u>35,900</u>		<u>32,800</u>
(b) Recurring Expenditure							
1. Pay of Officers and Staff		59,313	72		64,300		73,500
2. Allowances and Honoraria							
(i) Dearness allowance	26,415	94		29,270		32,610	
(ii) Other compensatory allowance including medical attendance	21	00		1,000		1,000	
(iii) Travelling allowance	4,669	00		6,000		5,000	
(iv) Honoraria	—		31,105	94	36,370	200	38,810
3. Leave salary and pension contribution			1,688	37	2,000		2,500
4. Provision for Indian Central Coconut Committee Provident Fund contribution			3,556	00	5,500		6,300
5. Petty construction and repairs			9,432	92	5,800		7,500
6. Other Charges							
(a) Farm Working expenses							
(i) Cultivation charges	7,574	96		12,000		13,900	
(ii) Manures and chemicals	7,310	95		11,000		13,200	



Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60
(iii) Maintenance of cattle	3,805 15	4,800	5,000
(iv) Miscellaneous expenses	17,257 78	20,000	20,000
(b) Apparatus and materials			
(c) Library books and periodicals	35,948 84	47,800	52,100
(d) Office contingencies	3,091 53	6,000	8,000
7. Scheme for procurement and supply of seed coconuts to States	2,577 33	3,000	4,000
	5,444 05	7,980	7,600
	—	26,170	—
	<u>1,52,158 70</u>	<u>2,04,920</u>	<u>2,00,310</u>
			<u>—</u>
			<u>150</u>

**ANNEXURE IV**  
**Central Coconut Research Station, Kayangulam-Budget Estimates for 1959-60 (Part I)**  
**2 (c) (ii) Receipts**

Particulars	Revised Estimates		Budget Estimates	
	Actuals 1957-58	1958-59	1959-60	
		Rs.	Rs.	
1. Farm Produce etc.	20,218 73	21,100	20,500	
2. Receipts from the Scheme for the control of leaf disease of coconuts.	600 37			

**II. A (ii) Expenditure.**

**(a) Non-recurring Expenditure**

1. Cost of land	500 50	—	1,000	
2. Layout		2,000		
3. Buildings-Residential and Non-residential	4 58	10,500	10,000	
4. Stores				
i) Farm Implements including Carts & Vans	530 72	2,500	2,000	
ii) Furniture & Office Equipments	4,765 52	2,500	3,000	
iii) Laboratory Equipments	2,472 45	5,000	25,275	
iv) Meteorological Observatory	403 72	1,000	1,000	
v) Photographic Equipment	2,433 95	2,000	3,000	
	10,606 36	13,000	34,275	
	11,111 44	25,500	45,275	



Particulars	Actuals 1957-58		Revised Estimates 1958-59		Budget Estimates 1959-60	
	Rs. nP.	Rs. nP.	Rs.	Rs.	Rs.	Rs.
(b) Recurring Expenditure						
1. Pay of Officers and Staff		67,386 78		71,400		76,250
2. Allowances and Honoraria			28,600		30,150	
i) Dearness Allowance	26,763 18					
ii) Other Compensatory Allowance including Medical Attendance	15 03		1,000		1,000	
iii) Travelling Allowance	5,550 28		6,000		6,000	
iv) Honoraria	—	32,328 49	500	36,100	500	37,650
3. Leave Salary and Pension contribution		1,704 66		2,000		1,500
4. Indian Central Coconut Committee Provident Fund contribution		4,611 00		8,000		7,000
5. Petty construction and repairs		5,4663 68		6,000		8,000
6. Other Charges:						
a) Farm Working Expenses						
i) Cultivation Charges	6,499 49		8,000		9,000	
ii) Manures & Chemicals	9,245 34		10,000		12,000	
iii) Maintenance of Cattle	—		—		—	
iv) Miscellaneous Expenses	14,776 48	30,521 31	15,000	33,000	16,000	37,000

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- b) Apparatus & Materials
- c) Library books and Periodicals
- d) Office Contingencies
- e) Scheme for the control of  
leaf disease of coconuts

4,999	53
2,828	72
5,780	23
<u>1,55,824</u>	<u>40</u>
1,617	70

5,000
3,000
15,000
<u>1,79,500</u>

5,000
3,000
8,000
<u>1,83,400</u>



**Indian Central Coconut Committee – Budget Estimates 1959–60 (Part II)**  
**(Second Five-Year Plan)**

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b) Recurring Expenditure	10,384 80	91,150	1,42,000
B. Grant-in-aid Schemes			
Regional Coconut Research Stations in -			
1) Orissa	27,382 00	15,650	22,750
2) Madras	—	3,510	3,672
3) Mysore	3,150 00	25,000	41,320
III. Marketing & Economic Surveys.			
i) Pilot Schemes for the correct estimation of area and yield of coconuts			
Grant-in-aid to States:-			
1) Kerala	—	10,000	26,100
2) Madras	—	7,000	16,477
3) Mysore	—	10,000	27,764
4) Andhra	—	7,000	16,969
5) Bombay	—	7,840	18,820



## Receipts

## Expenditure

Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60
	Rs. nP.	Rs.	Rs.
6) Orissa	—	7,000	16,250
7) West Bengal	—	—	19,822
8) Assam	—	10,000	30,208
ii) Compilation & analysis of data		28,920	18,928
iii) Enquiry into cost of cultiva- tion of coco- nuts in Kerala		25,500	51,805
iv) Scheme for the Revision of the Report on the Marketing of coconuts in India		16,300	27,600
IV. (a) Scheme for control of coco- nut pests in		—	—
1) Madras-Non- recurring Ex- penditure		8,000	—

Recurring Ex- penditure	10,000	12,611
2) Andhra-Non- recurring Ex- penditure	10,997	—
Recurring Ex- penditure	14,247	19,145
3) Bombay-Non- recurring Ex- penditure	4,550	3,550
Recurring Ex- penditure	10,000	18,281
4) Kozhikode Non- recurring Expenditure	1,000	—
Recurring Expenditure	4,000	5,280
(b) Scheme for the control of Anabe roga of coconut in Mysore	1,760 00	
V. Technological Schemes	6,445	8,000



## Expenditure

Receipts							
Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60	Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60
Rs.	nP.	Rs.	Rs.	Rs. nP.	Rs.	Rs.	Rs.
				i) Scheme for solvent extraction of oil cake at Regional Research Laboratory, Hyderabad			
				Non-recurring Expenditure		10,000	—
				Recurring Expenditure		2,347	10,433
				ii) Scheme for preparation of activated charcoal at Regional Research Laboratory, Hyderabad			
				Non-recurring Expenditure		—	—
				Recurring Expenditure		2,147	5,241

iii) Scheme for pre-  
paration of Vine-  
gar etc., at the  
Central Food  
Technological Re-  
search Institute,  
Mysore

		5,260	19,995
<u>1,35,684</u>	<u>38</u>	<u>5,76,000</u>	<u>11,69,791</u>

Refund to Go-  
vernment of  
India  
Closing Balance

1,67,077	62	—	—
64,325	25	—	—
<u>3,67,087</u>	<u>25</u>	<u>5,76,000</u>	<u>11,69,791</u>

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**ANNEXURE VI**  
**Administration - Budget Estimates**  
**for 1959-60.**  
**(Part II).**

Particulars	Actuals 1957-58.	Revised Estimates 1958-59.	Budget Estimates 1959-60
	Rs. nP.	Rs.	Rs.
1. Pay of Class III Staff	7,212 79	10,050	10,650
2. Pay of Class IV Staff	662 61	1,090	1,180
3. Dearness Allowance	6,396 97	8,735	9,110
4. House Rent Allowance	821 38	1,090	1,140
5. Provident Fund Con- tribution	667 00	1,700	1,650
6. Travelling Allowance	—	200	1,000
Total	15,760 75	22,865	24,730

# ANNEXURE VII.

## II A (i) Central Coconut Research Station Kasaragod - (Part II Budget) Budget Estimates for 1959-'60.

Particulars	Actuals 1957-58		Revised Estimates 1958-59		Budget Estimates 1959-60	
	Rs. nP.	Rs. nP.	Rs.	Rs.	Rs.	Rs.
<b>(a) Non-recurring Expenditure</b>						
1. Cost of Land				30,000		15,500
2. Layout				4,000		
3. Buildings - Residential and Non-residential		45,910 00		16,200		78,000
4. <b>Stores</b>						
(i) Farm implements including carts and vans	1,612 65		2,000		15,700	
(ii) Furniture and office equipments	3,227 25		1,550		1,000	
(iii) Laboratory Equipments	2,124 10	6,964 00	7,600	11,150	1,17,400	1,34,100
		<u>52,874 00</u>		<u>61,350</u>		<u>2,27,600</u>
<b>(b) Recurring Expenditure</b>						
1. Pay of officers and staff		2,223 01		31,440		51,350
2. <b>Allowances and Honoraria</b>						
(i) Dearness Allowance	1,542 46		17,720		26,340	
(ii) Travelling Allowance			3,000		3,000	

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Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60
(iii) Other compensatory allowance including Medical Attendance		600	1,000
(iv) Honoraria	—	—	—
3. Petty Construction & Repairs	1,542 46	21,320	30,340
4. Provident Fund Contribution	154 00	2,000	2,000
		3,700	4,000
5. Other Charges			
(a) Farm Working expenses	—	—	5,000
(b) Apparatus and Chemicals	20 47	12,500	32,950
(c) Library Books and Periodicals		2,000	6,000
(d) Office Contingencies	5 50	2,800	3,300
	25 97	17,300	47,250
	<u>3,945 44</u>	<u>75,760</u>	<u>1,34,940</u>
			<u>— 1162 —</u>

# ANNEXURE VIII

## II. (a) (ii) Central Coconut Research Station, Kayangulam (Part II Budget) Budget Estimates for 1959-60

Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60
	Rs. nP.	Rs.	Rs.
<b>(a) Non-recurring Expenditure</b>			
1. Cost of Land		40,000	
2. Layout		3,000	
3. Buildings - Residential and Non-residential	15,073 00	3,662	10,500
4. Stores			
(i) Farm implements including Carts and Vans		500	1,20,700
(ii) Laboratory Equipments	496 03	15,000	65,000
(iii) Photographic Equipments	4,858 36		
(iv) Furniture & Office equipments	5,354 39	15,500	1,89,000
	<u>20,427 39</u>	<u>62,162</u>	<u>1,99,500</u>
<b>(b) Recurring Expenditure</b>			
1. Pay of officers and staff	2,847 67	32,100	34,700
2. Allowances and Honoraria			
(i) Dearness Allowance	2,009 96	22,300	23,100



Particulars	Actuals 1957-58	Revised Estimates 1958-59	Budget Estimates 1959-60
(ii) Other compensatory Allowance including Medical attendance		1,000	1,000
(iii) Travelling allowance	2,009 96	27,300	29,100
3. Other charges	5,387 17	28,250	74,700
4. Indian Central Coconut Committee Provident Fund Contribution	140 00	3,500	3,500
	<u>10,384 80</u>	<u>91,150</u>	<u>1,42,000</u>
			<u>164</u>
			—

*Subject No. 7.* Amendments to the Indian Central Coconut Committee Provident Fund Rules.

The Finance Sub-Committee, at its meeting held on the 3rd November 1956, had agreed to amend Rule 5 of the Indian Central Coconut Committee Provident Fund Rules so that the Rules might become applicable to every salaried officer and servant of the Committee employed either *temporarily* or *on a long term* basis, not being a person who is a permanent servant of the Central Government or of a State Government whose services have been lent or transferred to the Committee. Prior to this amendment the Rules were not applicable to a person in the temporary service of the Committee.

At the same meeting, the Finance Sub-Committee agreed to accept a suggestion of the Ministry of Food and Agriculture, (Indian Council of Agricultural Research) to amend Rule 8 (3) of the Indian Central Coconut Committee Provident Fund Rules to read as follows:—

“A person employed under the Committee, either temporarily or on a long term basis, may subscribe with effect from the date of his appointment under the Committee but he will be entitled to claim the Committee's share of contribution to the Fund only with effect from the date on which he completes 3 years of his service under the Committee”.

Rule 18 (1) (b) of the Indian Central Coconut Committee Provident Fund Rules authorised the Committee to deduct from a subscriber's account any amount of the contribution made by the Committee if a subscriber resigned his employment under the Committee within *five years* of the commencement thereof, unless the resignation was tendered under certain specified circumstances.

As, in the amended Rule 8(3) mentioned above, it was stipulated that a person employed under the Committee could claim the Committee's share of contribution with effect from the date of his completing *3 years of service* under the Committee, the Finance Sub-Committee, at its meeting mentioned above, decided to amend



Rule 18 (1) (b) also so that any deduction from the Committee's contribution to a subscriber's account would be made only if he resigned his employment within 3 years of the commencement thereof.

The above amendments were communicated to the Government of India who notified them in Ministry of Food and Agriculture, (Indian Council of Agricultural Research) Notification No. 7-15/57-Com. I, dated 15-4-1957.

In September 1957, the Government of India pointed out that the amended Rule 8(3) was inconsistent with Rule 11 (4) and that the latter therefore should be amended suitably.

Rule 11(4) lays down that where a subscriber has subscribed to the Fund with retrospective effect the Committee shall also contribute for the period for which such retrospective effect is given.

The Government of India were then informed that there was nothing in Rule 11(4) which could be considered as coming into conflict with Rule 8(3). It was pointed out to them that Rule 11(4) was originally framed to enable the Committee to pay its contribution in cases where temporary employees and probationers (who could not subscribe to the fund during the period of their temporary service on probation) on confirmation, elected to subscribe for the period of their temporary service or probation also, under the old Rule 8(3). It was also pointed out to them that with the amended Rule 8(3) conferring on every temporary employee the right to subscribe to the fund from the date of his appointment, certain employees of the Committee who had been serving the Committee on a temporary basis had elected to subscribe to the fund with retrospective effect from the date of their appointment, that the Committee would be making its contribution for this back period and that this would not confer any right on a subscriber to claim the Committee's contribution to be paid to him until and unless he had completed three years of service under the Committee.

The Ministry of Food and Agriculture (Department of Agriculture), however, have now forwarded to the Committee the following U. O. Note of the Ministry of Law (Legislative Section):—

“There is some inconsistency between Rule 8(3) as amended and Rule 11(4) of the Provident Fund Rules. This was pointed out in this Ministry’s note at page 6 *ante* with which the Indian Council of Agricultural Research also agreed. The contrary view expressed by the Committee seems to be based on a misapprehension. The first part of Rule 8(3) enables an employee, whether temporary or otherwise, to subscribe to the Fund from the date of his appointment. The latter part of that rule, however, contains an express provision that the Committee’s contribution can be claimed only with effect from the date of completion of 3 years (and not with effect from the date of the appointment). To this extent, therefore, this Rule is inconsistent with Rule 11 (4) under which the Committee’s contribution can be made with retrospective effect. The correct position may be explained to the Committee and the question of suitably amending the rules considered in consultation with the Committee”.

When the old Rule 8(3) was amended, the amended Rule had been interpreted to mean that the Committee would contribute to a subscriber’s account during the first 3 years also, but that this contribution could not be claimed to be paid to him by a subscriber until and unless he had completed 3 years of service under the Committee.

The Law Ministry’s note quoted above would, however, seem to show that the Committee would not make any contribution during the first three years of a subscriber’s service and that the contribution would be started to be paid only with effect from the date of completion of three years’ service by the subscriber.

This would seem to detract from the general principle that the employer should contribute for all the periods during which the employee is eligible or obliged to subscribe.



The Law Ministry's interpretation would also seem to be at variance with the amended Rule 18(1)(b) accepted and notified by the Government of India for if there was to be no contribution from the Committee during the first 3 years of a subscriber's service, it would be unnecessary to say that any amount from the Committee's contribution would be deducted for payment to a subscriber if he resigned before the completion of 3 years of service.

The Sub-Committee may now decide (1) whether they accept the interpretation put on the amended Rule 8(3) by the Law Ministry and would retain it as it is or (2) whether they would, accepting the general principle of employer contributing during the period the employee subscribes agree to the Committee contributing to a subscriber's account from the date of his appointment, subject only to the condition that if a subscriber resigns before completing 3 years of service, he cannot claim to be paid the Committee's contribution, unless the resignation is covered by one or other of the exempting circumstances mentioned in Rule 11(4).

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*Subject No. 9.*      Organisation of coconut technological research.

The Indian Central Coconut Committee at its 25th meeting held on 31-1-1958 had considered the question of organising coconut technological research and accepted *inter alia* the following recommendations of its Technological Sub-Committee:—

1. that programmes for technological research be initiated at the existing technological institutions, but the staff recruited for the purpose be selected as regular employees of the Committee and posted at the different centres;

2. that the Regional Research Laboratory, Hyderabad be invited (a) to take up studies on the solvent extraction of coconut oil cake obtained by different methods and (b) to carry out trials with coconut shells

and that any financial provisions required for the above items of work be made after getting detailed proposals from the Hyderabad Laboratory;

3. that the Central Food Technological Research Institute, Mysore, be requested (a) to try the preparation of vinegar from coconut neera and (b) to submit notes on work already done by them regarding the processing of de-oiled coconut cake to render it suitable for human consumption, the preparation of coconut proteins and the treatment of the carbohydrate fraction of coconut meal and (c) to forward programmes of work which could profitably be initiated.

Detailed proposals forwarded by the Regional Research Laboratory, Hyderabad and the Central Food Technological Research Institute, Mysore for implementing the above recommendations of the Committee were considered by the Technological Sub-Committee at its meeting held on 30-7-'58. A copy of the proceedings of the meeting of the Sub-Committee is attached.

The financial implications arising out of the recommendations of the Sub-Committee are the following:—

<i>Name of scheme</i>	<i>Amount sanctioned</i>
1. Scheme for solvent extraction of coconut oil cake at the Regional Research Laboratory, Hyderabad.	Rs. 29,076
2. Scheme for preparation of activated charcoal from coconut shells at the Regional Research Laboratory, Hyderabad.	Rs. 7,388
3. Scheme for coconut technological work at the Central Food Technological Research Institute, Mysore.	Rs. 40,200

It may be mentioned in this connection that a provision of Rs. 3.9 lakhs was made for coconut technological work at the Central Coconut Research Station, Kasaragod under the scheme for the development of the Station under the II Five-Year Plan. The Committee at its last meeting had, however on the recommendation of its Technological Sub-Committee, decided that only studies on the curing of copra and storage of copra and



coconut oil cake might be taken up at the Station at a cost of Rs. 1,10,506 for the Plan period. There will thus be a saving of Rs. 2.8 lakhs in the provision made for coconut technological work at the Central Coconut Research Station, Kasaragod. The expenditure on the schemes mentioned above can be met from the savings of Rs. 2.8 lakhs.

The Sub-Committee may now decide whether they approve of the financial commitments arising out of the recommendations of the Technological Sub-Committee.

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**Minutes of the Meeting of the Technological Sub-Committee of the Indian Central Coconut Committee held at 2.30 P.M. on 30-7-1958 in the Office of the Indian Central Coconut Committee, Ernakulam.**

Present:-

Dr. V. Subrahmanyan – Chairman.  
Shri K. P. Amrithanatha Iyer.  
Shri C. M. John.  
Shri C. V. Narayana Iyer.  
Dr. P. J. Gregory – Secretary.

The following were present by invitation:-

Dr. K. P. V. Menon, Director, Central Coconut Research Station, Kayangulam.  
Dr. K. M. Pandalai, Joint Director, Central Coconut Research Station, Kasaragod.  
Shri V. R. Menon, Assistant Information Officer, Press Information Bureau, Ernakulam.

The following members expressed inability to attend the meeting:-

Shri K. P. Madhavan Nair.  
Shri P. T. John.  
Shri T. Bhaskara Rao.  
Shri Om Prakash.

Welcoming the members, the Chairman stated that certain important decisions were taken at the last meeting of the Sub-Committee and he was glad that they were also accepted by the main Committee. They related to the principles relating to the selection of programmes, which should be primarily of value to the grower and to the industry. He also drew attention to the principles approved for the selection of staff so that the latter would be attracted to the service. The primary necessity is that the staff selected to the service should feel that they have some security and a career to look forward to in the service of the Coconut Committee. Such a procedure would also ensure that the Committee would be able to make the best use of the experience collected by its staff.

Passing on to the papers before the meeting, the Chairman stated that he was glad that some concrete programmes had been received from two of the National Laboratories which have also adequate facilities to carry out the work. He expressed the hope that other institutions will also come forward with suitable programmes. He was glad that the Director, Central Coconut Research Station, Kayangulam, and the Joint Director Central Coconut Research Station, Kasaragod had listed the more important problems for study. He also expressed his thanks to one of the members of the Sub-Committee (Shri Amrithanatha Iyer) who had suggested useful programmes based on his own experience.

The Chairman next referred to his visit to the Central Coconut Research Station at Kasaragod on 29-7-1958. He stated that good work in the Agronomical and Botanical aspects was being done in spite of the limited facilities that are available there. The new buildings were coming up rather slowly and he felt that it would take at least six months, before they could be conveniently occupied. He then referred to his discussions with the Joint Director and other members of the staff at the Kasaragod Station. It was felt by the latter that the entire space which would be available in the new buildings would be required for the office and the present sections which were already scattered over



different buildings. While expressing the hope that one more wing could soon be added to the new building, the Chairman felt that some beginning could be made in technological work if one or two rooms in the new block could be allotted for the purpose in conjunction with the Chemistry section. He also stated that there will soon be necessity to build a work-shop. The equipments and other accessories required for technological work and also for the work-shop can be drawn up in advance and the Central Food Technological Research Institute, Mysore, will be glad to help with necessary advice and assistance. The main difficulty will be in getting materials which require foreign exchange. Quite a lot of things, however, are now available in the country and if prompt steps are taken they can be acquired out of funds already available. In addition to this, certain items of equipment can be got fabricated by the Mysore Institute which has excellent facilities in this direction. It may take four or five years, if not a little more, for building up a small technological laboratory, but even that would be possible only if a beginning is made immediately. Even then, certain lines of work will have to be done at other centres which are already equipped for such work. Under the present condition of the country, we should make the maximum use of available facilities wherever they may be.

The different items of the agenda were then taken up for discussion.

### **Report of action taken on the recommendations made at the last meeting**

The Secretary reported about the action taken on the recommendations made at the meeting of the Sub-Committee. He drew attention to the advertisements for the technical posts sanctioned for technological work at the Kasaragod Station. He also mentioned that a number of applications were received through the Employment Exchanges. As for the funds, the necessary provision will be made out of the savings even though no separate financial provision had been made for technological research during the current year. He also

referred to the distribution of expeller cake obtained from Tata Oil Mills Company for study at various centres. He also referred to the various other items which would come up later for discussion at the meeting.

Shri C. M. John raised a query about the appropriateness of the term 'de-oiled cake' that has been mentioned in some of the papers.

The Sub-Committee felt that the term "de-oiled cake" should be confined to the material from which practically all the oil had been removed. The term would thus apply to the solvent extracted meal as also to that obtained by any other process which would leave less than 1 or 2 per cent of the oil in the cake.

There was also a discussion about the production and utilisation of de-oiled cake in the country. At the present time solvent extraction is largely confined to groundnut cake and even in regard to that there was a ban on the use of both the oil and the cake for human or animal consumption. There was, in fact, some practical difficulty in some parts of the country in disposing of the cake obtained after solvent extraction. This was considered to be most unfortunate because solvent-extracted oil and cake are being used for human use and animal feed respectively in several of the continental countries and also in many parts of America. If both the oil and the cake could be completely freed from the solvent, there should be no difficulty in using them. They are in fact cleaner and better products than those obtained by the present methods. In this connection the Chariman drew attention to some practical difficulties arising from the solvents as now distributed in the country. Hexane with a narrow boiling range is being chiefly used in other countries, whereas, in India, solvents with wider boiling range are now being distributed. It is reported that in some cases the range of boiling point is as wide as 60 to 120°C. In such a case it would be difficult to remove the last traces of the higher boiling fractions which are bound to be present in such solvents. The finished products are also bound to smell. Hydrocarbons may not do any serious harm; but they are, nevertheless, foreign to animal system and



should be excluded. There should be collaboration between the distilling industry and the research institutions so that the correct type of solvents would be produced and utilised in the best manner.

The Sub-Committee generally agreed that in the case of coconut there was a strong case to apply solvent extraction and other methods which would remove the last trace of oil. The ghani method yields a cake with more than 20% oil and this results not only in losing a very valuable product, but also in the rapid spoilage of the cake itself. Both the oil and the cake from coconut are high class products which should be prepared in the best possible manner and in a condition which would ensure good keeping quality. In this connection, the Chairman drew attention to the high sugar content of the coconut cake which also tends to interfere with its keeping quality. The sugar fraction which includes some invert sugar renders the cake hygroscopic, so much so that under the conditions of high humidity which prevail in Kerala the cake absorbs as much as 30% moisture in a very short time. This results in fungus growth and also heavy insect infestation. This should be taken care of in the final processing of the product.

*Subject No. 1.* Organisation of technological research on Coconut-Scheme for solvent extraction of Coconut Oilcake at the Regional Research Laboratory, Hyderabad.

The Sub-Committee was of opinion that the programme was a very desirable one, but it was doubtful whether as much as 3 years would be required for the standardisation of conditions especially when all the necessary equipment was already available at the Hyderabad Laboratory. While agreeing, in principle, that the scheme of the Regional Research Laboratory, Hyderabad, should be started, the Sub-Committee felt that the necessary funds be provided for one year in the first instance with scope for extension for a further period, if considered necessary.

Coming to the details of the programme, the Sub-Committee felt that the quality of oil extracted from the cake as also that of the residual cake itself would

depend on the time which lapses between the crushing and the receipt of the cake at Hyderabad which is far removed from the main coconut milling areas. Necessary steps should be taken to obtain the cake in the shortest possible time from Bombay or Ernakulam as the case may be. There will also be need to carry out some storage studies of both the oil and the cake, and to conduct some feeding trials with the product at different stages. The possibility of collaboration with other institutions for such work should be considered. It was felt that eventually the solvent extraction unit, when established, will have to be located in the coconut milling areas so that there may be some arrangements for the collection and utilisation of the cake in the shortest possible time after the crushing. Steps should also be taken to popularise the use of solvent-extracted coconut cake in such areas.

The Chairman stated that he was glad that the Hyderabad Laboratory was in a position to take up this important programme. He mentioned at the same time that similar facilities were also available in the Central Food Technological Research Institute, Mysore. He felt that side by side with the Hyderabad programme some work may also be carried out in Mysore primarily for studying the possibility of using alcohol as solvent. The Mysore laboratory had specialised in this line. Unlike some other oils, coconut oil was miscible, even at comparatively low temperatures, with alcohol so that the use of the latter solvent offers considerable scope. Unlike the hydrocarbon solvents, Ethyle alcohol is a single substance, with a definite boiling point. As alcohol is the important constituent in several beverages and liquors, there will be no adverse consequence if minute quantities are left behind either in the oil or in the cake, though in the interests of economy and efficiency the solvent should be completely removed. The Chairman also stated that the Mysore Institute could carry out the programme as a part of the Institute's own work without getting any special grant for the purpose from the Coconut Committee. This was agreed to by the Sub-Committee.



Coming to the budget, as submitted by the Hyderabad Laboratory, the Sub-Committee was agreeable to the provision towards staff, allowances and contingencies, but felt that a sum of Rs. 20,000 towards equipment may not be necessary in the first year. The Sub-Committee recommended the provision of Rs. 10,000 with the suggestion that if additional funds are required, the proposal could be considered at the next meeting of the Sub-Committee.

*Subject No. 2.* Organisation of coconut technological research – Scheme for preparation of activated charcoal from coconut shell at the Regional Research Laboratory, Hyderabad.

The Sub-Committee was of opinion that the scheme of the Hyderabad Laboratory deserves support. At the same time it was of opinion that as coconut shell is a costly commodity, the economics of production deserved some careful study. There are also other sources and some of these are already being used for the production of activated charcoal. The product made out of coconut shell will have to compete with them on the basis of some special quality. Activated charcoal from coconut shell was known to be highly adsorptive in respect of certain noxious gases. The Sub-Committee expressed the hope that the Hyderabad Laboratory would devote some special attention to the special properties of the charcoal from coconut shell.

In the light of the above discussions the Sub-Committee recommended the provision of funds as proposed by the Hyderabad Laboratory for a period of one year in the first instance. It was noted that no capital grant would be required for that period.

*Subject No. 3.* Organisation of coconut technological work – Programme of work to be undertaken at the Central Food Technological Research Institute, Mysore.

Speaking as a member of the Sub-Committee, the Chairman, representing the laboratory which had sponsored the scheme, explained that the scheme of the

Mysore Institute was a comprehensive one which was designed to deal with the utilisation of coconut meal for production of concentrated protein foods and also the utilisation of coconut neera and water in different ways. He also stated that the Institute would include additional items such as the extraction of oil from the cake by alcohol and the integrated method for the preparation of oil, protein and coconut extract as a single operation without drying the coconut kernel. Such methods are already being applied in other countries though on a limited scale. He drew attention to the high quality of oil obtained by the integrated method and also to the possibility of bottling the water soluble fractions which would, to a large extent, correspond to coconut water. He also stated that his Institute has carried out some preliminary studies on the desiccation of coconut. In respect of the utilisation of the coconut meal, the necessary animal and human feeding programmes will also be carried out.

The Sub-Committee approved of the programme submitted by the Mysore Institute. It was felt, however, that the scheme may be sanctioned for a period of 2 years in the first instance.

In respect of the budget, it was recommended that the post of Clerk-cum-Typist may be converted into one of Steno-Typist in the usual grade of the lower division clerk with the usual additional allowance of Rs. 20.

*Subject No. 4.* Technological research on coconut – Suggestions of the Director, Central Coconut Research Station, Kayangulam, and the Joint Director, Central Coconut Research Station, Kasaragod.

The Sub-Committee was thankful to the Director of the Central Coconut Research Station at Kayangulam and the Joint Director of the Central Coconut Research Station at Kasaragod for the problems they had listed. The following observations were made in respect of the different items:—

(1) *Storage of tender coconut.* The Sub-Committee was of opinion that this was not really a serious problem



because the harvesting and the sale of tender coconuts were already being carefully regulated. Cold storage may extend the life of the tender coconut, but this may not be very necessary excepting in some big cities. The possibilities in this direction may be studied by the Mysore Institute, as a part of its programme. The ultimate object of the study should be to develop a method of bottling coconut water in such a way that the quality will not be impaired. The bottled product should be available at near about the same price as the water from the tender coconut. This will be of special value in seasons when tender coconut is not available.

(2) *Desiccated coconut.* It was recognised that there was need for setting up more plants in the country so that it would be self-sufficient in respect of this commodity. It was noted that the Mysore Institute had listed the subject as part of its programme.

(3) and (4) *Oil extraction by centrifuging and extraction of oil from fresh coconut meal without converting it into copra.*

It was noted that these subjects had already been listed as part of the programme of the Mysore Institute.

(5) *Milk from Coconut.*

The possibility of making condensed milk of coconut emulsion both by itself and in combination with skimmed milk powder deserved special attention. It was suggested that the Mysore Institute might carry out some preliminary studies and report about the results at the next meeting of the Sub-Committee.

(6) *Simple methods of refining coconut oil.*

It was felt that this subject could be conveniently studied at the Central Coconut Research Station, Kasargod. The Joint Director agreed that this could be done there.

(7) *Lauric acid from coconut oil.* It was felt that the Regional Research Laboratory, Hyderabad, or the National Chemical Laboratory Poona, or the Department

of Chemical Technology, Bombay, could take up this study. It was suggested that the Secretary might contact these institutions and ascertain their interest in taking up this programme. If any programme of work is received, it could be considered at the next meeting of the Sub-Committee.

(8) *Industrial uses of coconut shell.*

It was noted that this programme has already been assigned to the Regional Research Laboratory, Hyderabad. It was felt that the same Laboratory, could carry out some preliminary studies on the possibility of using coconut shell as a source of furfural. The Sub-Committee also felt that the Regional Research Laboratory which had excellent facilities could also consider the possibility of obtaining certain by-products through the low temperature carbonisation of coconut shell.

(9) *Manufacture of potassic manures from coconut husk, petiole, etc.*

It was recognised that this line of work deserves some study without prejudice to the retting of the husk. The removal of the salts may actually help the retting process. The Joint Director, Central Coconut Research Station, Kasaragod, agreed to carry out some preliminary work on this aspect.

(10) *Extension of the life of plaited coconut leaves.*

The Sub-Committee was of opinion that this was a very important subject and deserved systematic investigation. It was felt that even a short period of soaking in certain solutions or spraying with chemicals like copper sulphate or sodium chromate may extend the life of the plaited coconut leaf and discourage the growth of white-ants. The Joint Director, Central Coconut Research Station, Kasaragod, who has already carried out some work in this line, agreed to carry out further work in this line. The Sub-Committee was of opinion that any improvement in the life of the plaited leaf would be of considerable practical value and would also be greatly appreciated by the people. It was felt that this line of



work deserved some priority because it may yield useful results in a very short time.

The perishing of the plaited leaf may be due to various causes – apart from attack by fungi and insects. Certain amount of physical degradation may also be taking place. Some whole-time fundamental work on these aspects may yield fruitful results.

(11) *Use of coconut oil as a motor fuel or as lubricant.*

The Sub-Committee was of opinion that this line of work was not very promising and may be left out.

(12) *Utilisation of shed buttons.*

The Sub-Committee was of opinion that if sufficient quantity of tannin is present in shed buttons, it could make a useful addition to our present resources. The collection of shed buttons may now present a problem, but once the economics of the extraction is established, there may not be difficulty in collecting very large quantities of the material. It was suggested that the Joint Director, Central Coconut Research Station, Kasaragod, may send representative samples to the Central Leather Research Institute, Madras, for necessary preliminary study and submission of suitable programme if the material is found promising.

*Subject No. 5. Miscellaneous matters.*

(1) *Studies on the utilisation of coconut cake for cattle feed.*

The main object of the study would be to compare the merits of the cake obtained by the different methods including that by solvent extraction. It was felt that a short duration study as proposed by the Indian Veterinary Research Institute, Izatnagar, may be adequate to start with. The Secretary of the Coconut Committee was requested to contact the Izatnagar Institute and to arrange for the despatch of the required materials. In this connection it was felt that expeditious despatch was very important. Otherwise the results will not be of much value. The best course would be to arrange for despatch by through waggon which could reach the destination in about a fortnight after the crushing.

- (2) *Improvements in the extraction of oil from copra by rotary and expeller.*

The Sub-Committee was not clear about the significance of the query from the Principal of the Oil Technological Institute, Anantapur. It was felt, however, that the Secretary may draw the attention of the Principal to the Publication entitled "Marketing of Coconut and Coconut Products in India" issued by the Agricultural Marketing Adviser to the Government of India. This publication contains a fair amount of information bearing on the present position in respect of the production of coconut oil and cake by the ghani, the rotary and the expeller.

(3) The Sub-Committee considered a letter from the Research Director, Nutrition Research Laboratory, International Commission for the Prevention of Alcoholism, Bombay. It was not clear as to what kind of programme the Director of that Laboratory had in mind. The Sub-Committee suggested that the Secretary may contact the Director and ascertain from him the type of programme that he wished to take up. The Director may also be invited to state the type of facilities and staff that he has in his institute.

(4) The Sub-Committee considered a number of programmes that had been listed by Shri K. P. Amrithanatha Iyer, a member of the Sub-Committee. The Sub-Committee was thankful to Mr. Iyer for the various suggestions that he had made. It was felt that some information was already available in respect of certain aspects. This should be collected and sent to Mr. Iyer as soon as possible. In this connection the Joint Director, Central Coconut Research Station, Kasaragod stated that some part of the work already done at Kasaragod was now under publication. Further work bearing on the possibility of using neem or chalmugra oil cake or the possibility of growing *Derris elliptica* as an intercrop could also be studied. The Sub-Committee felt that the incorporation of lime, though useful in certain ways, may result in the destruction of the nitrogenous constituents and consequent loss of the fertilising value of



compost. The broad principles of the programme suggested by Mr. Iyer were accepted and the Joint Director, Central Coconut Research Station, Kasaragod, promised to carry out more work in this line. Similar work would also be carried out at the Central Coconut Research Station, Kayangulam.

With a vote of thanks to the Chair, the meeting terminated at 5-30 P. M.

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*Subject No. 11.* “General conditions applicable to grants made by the Indian Central Coconut Committee” – Modification to

The Ministry of Food and Agriculture, Government of India, had, in March 1957, intimated to this Committee their decision that all the Central Commodity Committees should frame instructions for the preparation of research schemes, technical programmes, reports, etc., on the lines of those framed by the Indian Council of Agricultural Research, in order to bring uniformity in this respect. Suggestions for adopting the Indian Council of Agricultural Research’s “Instructions” for the preparation of Research Schemes, Technical Programmes and Reports by modifying the “General Conditions applicable to grants made by the Indian Central Coconut Committee” were, therefore, placed for the Committee’s consideration at its last meeting held in January 1958 and they were approved by the Committee. (Vide Sub. No. 20 of the proceedings of the 25th meeting).

A copy of the modified set of “General conditions” is attached. The Government of India, to whom it was forwarded for approval, have stated that Clause X of the terms and conditions governing the grants made by the Indian Council of Agricultural Research, corresponding to item 10 of the revised “General conditions” of this Committee, has been revised as follows and have suggested that this Committee might consider revision of item 10 of its “General conditions” to make it conform with the Council’s clause X:—

“If any person already in the service of the State Governments is transferred for employment under the scheme, only the initial pay sanctioned for the post and allowances thereon and not the actual pay and allowances of the person transferred to the scheme will be debited to the scheme, provided that this clause will not apply in cases of State Government’s employees recruited for employment under the scheme through the Public Service Commission”.

Besides, the Indian Council of Agricultural Research have since informed the Committee that the following modifications have been made in their “Instructions for the preparation of research schemes, technical programmes and reports”:-

1. In the proforma for the submission of new research schemes to the Council, the following entry has been substituted against entry No:- “6 Practical utility of the investigation including economic implication of the results likely to be achieved through the scheme”.

2. In the proforma for submission of proposals for the continuance of current research schemes to the Council the following entries have been substituted for the existing entries Nos. 5 and 6:-

“5. A brief summary of results achieved so far and their economic implication”.

“6. Further work remaining to be investigated including the economic implication of the results likely to be achieved through the scheme”.

3. In the instructions for the preparation of annual progress reports in respect of schemes financed by the Council, the following words have been added at the end of instruction No. 1:-

“Basic price and cost data should invariably be given to work out the economics of the results achieved”.

4. In the instructions for the preparation of final reports on schemes, the following words have been added at the end of instruction No. 2:-



“Basic price and cost data should invariably be given to work out the economics of the results achieved”.

5. In the proforma for the preparation of annual progress reports, under “Section C, Results”, the following new clause has been inserted at the end:—

“(e) Basic data for working out the economic value of the results reported during the year should also be given”.

It is suggested that the modifications indicated above may be effected in appropriate places in the “General Conditions Applicable to grants made by the Indian Central Coconut Committee”.

It is also suggested that a new condition shown below, may be incorporated in our “General conditions” as a similar condition exists in the schedule of terms and conditions governing the grants from the Indian Council of Agricultural Research.

“II-A. Before a scheme is started and the staff required therefor is appointed, the State Government Institution concerned should ensure that requisite facilities by way of suitable land, equipment, apparatus, etc., are available at the commencement of the scheme”.

The Sub-Committee may now decide whether the above-mentioned suggestions may be approved.

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### **General Conditions Applicable to Grants made by the Indian Central Coconut Committee**

#### ***Control of Funds.***

1. The grant will not be regarded as a subvention towards the normal work of the State Agricultural or other Department, but will be exclusively utilised for the purpose for which it is granted.

2. The expenditure incurred from the grant will be audited by the Accountant General of the State, who will furnish the Committee annually with a certificate that

he had done so and that the grant has been spent on the objects for which it was made. In the case of grants to co-operative societies, the audit certificate issued by the authority competent to issue it under the Co-operative Societies Act of the State concerned will be sufficient.

3. The control over the grants will remain with the Committee. Re-appropriation between different sub-heads of expenditure in respect of schemes for which grants have been sanctioned may be made by the Committee who may authorise the Secretary to exercise the power of re-appropriation.

4. The unspent balance of the grant for a scheme for each year shall be refunded to the Committee or adjusted at the end of each year, as may be decided by the Committee.

5. All property acquired from the Committee's grant shall remain the property of the Committee; and such items as are non-perishable shall be returned to the Committee on the termination of the scheme, the incidental expenditure in that connection being met by the Committee.

Non-perishable items of property, if any, acquired from the joint funds of the Committee and the State Government should be sold in public auction on the termination of the scheme and the Committee's share of the sale proceeds, on the basis of the expenditure borne by it, should be credited to the Committee.

6. A list of the books and periodicals proposed to be purchased from the funds of the Committee should be submitted for the approval of the Committee.

7. All expenditure in respect of payment of rent on buildings and lands and acquisition of land and buildings shall be borne by the State Government concerned.

8. Where a scheme sanctioned by the Committee is not started within a period of 12 months from date of communication of sanction, the scheme shall not be worked without fresh sanction of the Committee.



*Appointment.*

9. Recruitment to all posts under the schemes will be made in accordance with the rules of the State Government applicable to posts of similar status under them. However, recruitment to posts the maximum pay of which exceeds Rs. 250/- per mensem should be made through the State Public Service Commission, subject to the condition that the prior approval of the Committee should be obtained to the terms contained in all advertisements and instructions, if any, before they are furnished to the Public Service Commission in connection with such recruitments.

*Note:*— This condition does not preclude the appointment of a candidate already employed under the State Government concerned.

10. The basis of the scales of pay of staff employed in schemes financed by the Committee will be the scales of pay of similar staff serving under the State Government concerned. The starting pay for all appointments will be the minimum of the scales of pay of such appointments, unless a higher initial pay is specifically sanctioned by the Committee. If any person already in the service of the State Government is transferred for employment under the scheme, only the net cost incurred by the State Government on account of the substitute in the chain of arrangements made in that connection and not the actual pay of the person transferred to the scheme, will be debited to the scheme.

11. No additions or alterations in the sanctioned scales of pay shall be made without the specific sanction of the Committee.

12. The staff employed in schemes financed by the Committee will be considered to be servants of the State Government concerned for all purposes and their leave salary will be met by the Government concerned.

13. The staff appointed under the schemes, especially such of them, as have been given special training for the work shall be transferred only if it is absolutely essential and as far as possible only after prior consultation with the Committee.

*Budget Estimates and Annual Returns.*

14. The budget estimates should be prepared to correspond with the financial year (1st April to 31st March) the expenditure on account of pay for the month of March being included in the estimates for the following financial year.

15. Detailed annual budget estimates of schemes should be submitted so as to reach the Committee's office by 1st September of the preceding year.

16. Revised budget estimates should reach the Committee's office by the 1st September of the year to which they relate.

17. Annual returns in the form prescribed, should be submitted soon after the close of each financial year.

18. No new schemes may be put into operation until the Central Government's sanction to the Committee's budget has been received and communicated to the authorities concerned.

19. The policy of the Committee is to supplement and not to supplant the work of the Agricultural or other Departments of the State concerned. The Committee's funds should not be spent where State funds are available.

*Research Schemes.*

19-A. Research Schemes should be submitted to the Committee in the proforma given in Appendix I.

19-B. A technical programme for each scheme should be prepared as indicated in Appendix II and included in the proposals.

20. Research schemes may be financed up to a period of 10 years subject to review at the end of the 3rd, 5th and 8th year, the Committee ordinarily bearing 50 per cent of the recurring expenditure, but a greater proportion in exceptional cases. To justify further financial help from the Committee after this period, special technical or scientific reasons are necessary. During the extension period (beyond the 10th year) the Committee's share of expenditure will



normally be limited to 33 $\frac{1}{3}$ %, any higher contribution being made only for special reasons.

21. All schemes not involving fundamental research will be examined from the economic point of view. As certain Indian Universities and their constituent colleges are now better equipped than formerly for research work in certain branches of science, they should be encouraged to take up such problems bearing on coconut cultivation as are adopted to their organisation and equipment.

22. A complete and thorough summary of the up-to-date work done and the knowledge gained on the problem in question in other parts of the world should accompany proposals for research schemes.

23. Receipts realised from research schemes shall be shared by the Committee and the State Government concerned in the proportion in which the recurring expenditure is shared by them.

24. Proposals for starting research schemes shall contain a detailed note on the benefits likely to accrue to the growers, manufacturers etc., or the agricultural economy of the country in general by the execution of those schemes.

#### *Co-operative Marketing Schemes:*

25. (a) Co-operative Marketing Schemes will be sanctioned in the first instance for periods not exceeding 5 years during which the recurring expenditure will be shared by the Committee and the State concerned on a 50:50 basis.

(b) Co-operative Marketing Schemes may be extended for further period not exceeding 3 years on condition that the Committee's share of expenditure does not exceed 33 $\frac{1}{3}$ % of the recurring expenditure.

#### *Coconut Nursery Schemes:*

26. (a) Coconut Nursery Schemes will be sanctioned in the first instance for periods not exceeding 5 years during which period the recurring expenditure will be shared by the Committee and the State on a 50:50 basis.

They may be extended subsequently for a further period not exceeding 5 years on condition that the Committee's share of expenditure does not exceed 33½% of the total recurring expenditure for the period of extension.

(b) After a nursery scheme has been in operation for a period of 10 years, it may be extended by another period not exceeding 5 years provided that the Committee's share of expenditure does not exceed 15% of the total recurring expenditure for the period of extension.

27. No seedling produced under the schemes should be sold under an age of 9 months from the date of germination. The seedlings will normally be sold at 8 annas each, ex-nursery; the receipts realised by their sale being shared by the State Government concerned and the Committee in the proportion in which the recurring expenditure is shared by them.

28. When a change in the variety of seedlings under distribution is made with the approval of the Indian Central Coconut Committee, further continuance of the scheme will be treated as a new nursery scheme and not as renewal of the original scheme.

29. No nursery scheme will be sanctioned unless sufficient evidence is forthcoming that the strain proposed to be distributed is the most suitable one for the area concerned.

30. In the case of schemes other than those relating to "Research", "Co-operative Marketing" and "Nursery" the Committee's share of expenditure will be limited to 50 per cent of the recurring expenditure during the first 5 years, 33½% during the next 5 years and 15% during the 5 years following. Receipts, if any, realised from such schemes will be shared by the Committee and the State Government concerned in the proportion in which the recurring expenditure is shared by them.

#### *Extension of Schemes:*

31. Proposals for extension of schemes should be submitted sufficiently early for consideration by the Committee at least nine months prior to the dates on which the schemes are due to terminate.



32. In framing proposals for extension, the grades of pay of staff should not be lengthened as a matter of course; the grades should correspond to the scales of pay of State Government servants discharging similar duties.

33. New items may be added to programmes of work under extension of schemes, provided they are specially brought to the notice of the Committee as new items and sanctioned by the Committee.

33. (a) Proposals for continuance of research schemes should be made in the proforma given in Appendix III.

*Progress Reports:*

34. Progress reports on schemes shall be submitted to the Committee annually and as and when required with such number of copies as may be required by the Committee.

35. Every report should be signed by the officer responsible for its preparation and countersigned by the appropriate authority.

36. In addition to the programme of work for the following year, the under-mentioned particulars should be furnished with each progress report:—

- i) Date of sanction of scheme.
- ii) Date of commencement of scheme.
- iii) Period for which sanctioned.
- iv) Amount sanctioned for each year of scheme.
- v) Expenditure incurred in each year.
- vi) Date of termination of scheme.
- vii) A copy of the approved programme of work for the year under report.
- viii) A short summary in non-technical language showing:—
  - a) the object of the scheme,
  - b) progress made from year to year and
  - c) results achieved to date.

The summary should refer only to important items in the approved programme of work.

37. Any marked changes in the programme since the submission of the last progress report should be

pointed out, as well as matters on which the guidance of the Indian Central Coconut Committee is needed.

38. Progress reports should contain sufficient details of the work done to enable independent conclusions to be arrived at.

39. Any collaboration contemplated with other scientists or specialists should be mentioned in the progress report.

39 (a). Annual Progress Reports on Research Schemes should be prepared in the proforma given in Appendix IV.

*Final Reports:*

40. With the close of a scheme a final report on it indicating clearly results of the investigations made should be submitted to the Committee in such form as may be required for publication. The final report should also indicate the practical utility of the results achieved and the steps to be taken by the Department or Departments concerned to implement them.

41. The facilities and assistance given by the Committee should be acknowledged in all published accounts of the work carried out under the schemes of the Committee.

42. The results of the investigations on Agricultural Research Schemes should be published in the Indian Coconut Journal or the Committee consulted before the work is published elsewhere.

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## APPENDIX I

Proforma for the submission of new research schemes to the Indian Central Coconut Committee.

(125 cyclostyled copies of the proposals for new schemes should be sent to the Committee).

1. Name of the scheme with location.
2. Objective (as distinct from technique)
3. Work already done on the subject in India and abroad and the reasons for the proposed investigations.



4. Technique proposed to be adopted for investigation (in brief)
  5. Duration of the investigation.
  6. Practical utility of the investigation (benefits likely to accrue to coconut growers, manufacturers, etc., or the agricultural economy of the country in general by the execution of the scheme.)
  7. Facilities available and / or that will be made available by the State Government.
    - a) Supervision
    - b) Land (area), irrigation, cultivation
    - c) Equipment.
  8. Recurring expenditure:—
    - a) Pay of Officer with details
    - b) Pay of establishment with details
    - c) Dearness allowance ("Dearness pay" and balance to be shown separately).
    - d) Other allowances.
    - e) Contingencies.
  9. Receipts anticipated.
  10. Share of the Indian Central Coconut Committee in the expenditure.
  11.                   do.                   do.                   receipts
  12. Certified that
    - a) the scales of pay, allowances, etc., proposed above are those admissible to persons of corresponding status employed under the State Government.
    - b) the present scheme cannot be combined with any scheme
      - (i) financed entirely by the State Government or
      - (ii) financed by or submitted to any other Commodity Committee or the Indian Council of Agricultural Research.
    - c) necessary provision for the scheme will be made in the State budget in anticipation of the sanction of the scheme by the Committee.
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## APPENDIX II

Instructions for the preparation of technical programmes for the entire period and yearly detailed programmes of work in respect of research schemes financed by the Indian Central Coconut Committee.

1. Wherever possible, related items of research should be grouped together under distinct headings for purposes of experimentation.
  2. The technical programmes for the entire period and yearly detailed programmes of work should be prepared on the lines indicated in the following proforma:—
    - (a) Name of the Scheme.
      - (b) (i) Date of commencement of research work under the scheme.
      - (ii) Headquarters of the scheme.
      - (iii) Site of the experiments.
    - (c) Object of the scheme (The objective of the scheme as distinct from its technical programme should be stated, showing briefly what its aim is)
    - (d) Technical programme for the entire period of the scheme.
    - (e) Yearly detailed programme of work.
  3. The yearly programme of work should give details of the different experiments to be undertaken during the year. For example, in manurial trials, the kind, composition and doses of manures to be tried as well as the basal dressings, if any, should be indicated. If the same or other treatments have been applied to plots in the previous years, this should also be stated.
  4. Details of all layout plans should be prepared and sent to the Director, Central Coconut Research Station, Kayangulam, Kerala State and his approval obtained before the commencement of the experiments. Any modifications in the approved layout should be made after consultation with the Director.
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### APPENDIX III

Proforma for submission of proposals for the continuance of current research schemes to the Indian Central Coconut Committee.

(125 cyclostyled copies of the proposals should be sent to the Committee).

1. Name of the Scheme with location.
2. Date of starting the scheme.
3. Date of termination of the present sanction.
4. Expenditure anticipated till termination of the present period of the scheme.
5. A brief summary of results achieved so far.
6. Further work remaining to be investigated.
7. Technical programme or technique.
8. Period for which extension is sought.
9. Recurring expenditure:-
  - a) Pay of officer with details.
  - b) Pay of establishment with details.
  - c) Dearness allowance ("dearness pay" and balance to be shown separately).
  - d) Other allowances.
  - e) Contingencies.
10. Receipts anticipated.
11. Share of the Indian Central Coconut Committee in the expenditure.
12. Share of the Indian Central Coconut Committee in the receipts.
13. Certified that,
  - a) the scales of pay, allowances, etc., proposed above are those admissible to persons of corresponding status employed under the State Government,
  - b) the present scheme cannot be combined with any scheme
    - i) financed entirely by the State Government or

- ii) financed by or submitted to any other Commodity Committee or the Indian Council of Agricultural Research.
  - c) necessary provision for the scheme will be made in the State budget in anticipation of the sanction of the scheme by the Indian Central Coconut Committee.
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## APPENDIX IV

Instructions for the preparation of annual progress reports on research schemes financed by the Indian Central Coconut Committee.

1. The report should be a carefully prepared account of the work done and the results achieved. It should be concisely phrased, and should not repeat verbatim the discussions of work done in previous years, except in so far as these must be mentioned for proper understanding of the current year's work. Summary tables, however, may often usefully include data from previous years for comparison with the current year's results. In the interpretation of experiments, special emphasis should be given to their implications for agricultural policy and practice. Where possible, suggestions should be made as to how important new knowledge can be rapidly made available to cultivators.

2. The report should be prepared in the following proforma for the year ending the 30th June.

### Section A - General

- 1. Date of commencement of the research work under report.
- 2. Date on which the present period of the scheme will expire.
- 3. Total recurring expenditure sanctioned.
  - a) Share of the Committee.
  - b) Share of the State Government.



4. Total recurring expenditure incurred during the year.
  - a) Committee's share.
  - b) State Government's share.
5. Receipts realised during the year.
6. Staff employed (excluding class IV). The names of the Officer-in-Charge of the scheme and scientific and technical personnel employed in the scheme, together with their designations, qualifications and scales of pay should be given.
7. Object of the scheme.

The objective of the scheme as distinct from its technical programme should be stated, showing briefly what its aim is.

### **Section B - Technical Programme**

1. Approved technical programme for the entire period of the scheme (brief).
2. Detailed programme of work for the year under report.
3. Detailed programme of work for the next year.

### **Section C - Results**

#### **Report on the work done**

a) The report should begin with a brief account of the seasonal conditions for the year under report (Detailed meteorological data need not be given).

b) Work done during the year under report should be reported under a brief heading in the order of items in the approved detailed programme of work for that year. If work on any item of the approved programme could not be undertaken during the year, the fact should be mentioned under the appropriate item.

c) A brief reference to the work done in previous years may be made for a proper understanding of the work for the year under report.

d) To facilitate reference to the work done, it would be desirable to report the work done for each item under two headings;

- (i) A brief reference to the work done during the previous years.
- (ii) Work done during the year.

### **Section D - Remarks of the Indian Central Coconut Committee and action taken thereon**

The annual report should include the remarks of the Committee on the previous year's report, and should indicate the action taken thereon.

### **Section E - Summary**

A brief account of the work done during the year under report should be given. If the investigations have reached a stage where definite recommendations of practical value can be made, these should be stated under this section.

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*Subject No. 19.* Parasite breeding station at Kasaragod—  
Proposal for the continuance of.

The Finance Sub-Committee, at its meeting held on the 12th June, 1957, had approved of the Kerala Government's proposal for continuing the station at Kasaragod for breeding parasites of the coconut pest *Nephantis serinopa* for a period of two years from 4-12-1956. (Vide subject number 6 of the proceedings of that meeting).

As the sanctioned period of the scheme is due to expire on the 3rd December 1958 and as it is found necessary to continue the work, the Kerala Government have forwarded a proposal (copy attached) for continuing the scheme for a further period of two years from 4-12-58. The following comments are offered on the proposal:—

1. The scale of pay of the Fieldman in the sanctioned scheme was Rs. 45-60 which has now been revised to Rs. 40-100. Similarly, the wages of the 3 mazdoors, fixed at Rs. 14/- per month, have now been enhanced to Rs. 20-35. There is also some increase in the rate of dearness allowance of the staff. It is stated that the



pay and allowances of the staff have been revised on the basis of those in force in the State on 31-3-1958.

2. The total expenditure on the scheme for a period of two years is estimated at Rs. 16,720/- including a non-recurring expenditure of Rs. 1,200/. As the scheme is now in the 6th year of its operation the recurring expenditure of Rs. 15,520/- is proposed to be shared by the State Government and the Committee in the proportion of 2:1 in accordance with the "General conditions applicable to grants made by the Committee". The Committee's share of the recurring expenditure would work out to Rs. 5,173/-. The recurring expenditure, however, includes a sum of Rs. 720/- provided for office and laboratory rent which, according to item No. 7 of the "General Conditions applicable to grants made by the Committee", has to be met entirely by the State Government. Thus the recurring expenditure to be shared by the State Government and the Committee works out to Rs. 14,800/-, and the Committee's share (33½%) will be only Rs. 4,933/.

The Sub-Committee may now decide whether the extension proposal may be approved subject to the condition that the rent on office and laboratory is entirely met by the State Government.

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Copy of letter No. 27923/Agri. (A) 1/58-5 dated 2nd August, 1958 from the Government of Kerala, Agriculture Department (Agri. A), Trivandrum, to the Secretary, Indian Central Coconut Committee, Ernakulam-1.

Sub:- Agriculture - Indian Central Coconut Committee - Scheme for Zonal Parasite Breeding Station for biological control of "Nephantis serinopa" at Kasaragod - Continuance beyond 3-12-1958 - Sanction - Grant of.

Ref:- Your letter No. F. 123 (1)/53 dated 8-7-1958.

I am directed to state that the period of extension of the scheme for the Zonal Parasite Breeding Station for the biological control of "Nephantis serinopa" at Kasaragod sanctioned in your letter No. 123(1)/53 dated 4-9-'57 is due to expire on 3-12-1958. This Government consider it necessary to continue the scheme for a further

period of two years. A copy of letter No. G. 4-8398/56 dated 2-7-1958 from the State Director of Agriculture together with a statement of the details of estimated expenditure for the Scheme for two years from 4-12-1958 is enclosed. The total cost of the extension for two years is Rs. 16,720 out of which the Indian Central Coconut Committee's share is Rs. 5,173 i. e.  $33\frac{1}{3}\%$  of the recurring expenditure.

I am to request you to obtain the approval of the Committee for the continuance of the Scheme for a period of two years from 4-12-1958 at a cost of Rs. 5,173 to the Committee and communicate it to this Government at an early date.

### ANNEXURE

#### Details of Estimated Expenditure for 2 years from 4-12-1958.

Details of Expenditure	State Government's share $66\frac{2}{3}\%$ Rs.	Committee's share $33\frac{1}{3}\%$ Rs.	Total expendi- ture Rs.
<b>Recurring Charges.</b>			
<b>Pay and Allowances of Establishment</b>			
1. Pay of one Entomology Assistant in the scale of Rs. 125-10-225 at Rs. 125 p. m.	2,000	1,000	3,000
2. Pay of one fieldman in the scale of Rs. 40-100 at Rs. 63 p. m.	1,008	504	1,512
3. Pay of 3 mazdoors in the scale of Rs. 25-35 at Rs. 25 p. m.	1,200	600	1,800
4. Dearness pay to Entomo- logy Assistant, fieldman and 3 mazdoors at Rs. 5 p. m. each	400	200	600



5. Dearness allowance to Entomology Assistant at Rs. 28 p. m., fieldman at Rs. 28 p.m. and 3 mazdoors at Rs. 20 p. m.	1,856	928	2,784
6. Special Dearness allowance to Entomology Assistant at Rs. 5, fieldman at Rs. 5 and 3 mazdoors at Rs. 7	496	248	744
7. Travelling allowance to Entomology Assistant, fieldman and mazdoors at Rs. 165 p. m.	2,640	1,320	3,960

#### Contingencies.

1. Office and Laboratory rent at Rs. 30	480	240	720
2. Laboratory and sundry expenditure	267	133	400

#### Non-recurring Charges.

Apparatus and materials	1,200	—	1,200
Total	11,547	5,173	16,720

Total expenditure Rs. 16,720

Committee's share 5,173

State Government's share 11,547

Copy of letter No. G. 4-8398/56 dated 2-7-1958 from the Director of Agriculture, Trivandrum, to the Secretary to Government, Agriculture Department, Trivandrum.

Sub:- Agriculture - Indian Central Coconut Committee scheme for establishment of a Zonal Parasite Breeding Station for biological control of 'Nephantis serinopa' at Kasaragod - Continuance beyond 3-12-1958 - Proposals.

Ref:- Government Memorandum No. 27923/Agri. A1/58-2 dated 28-5-'58.

The Government have, as per G. O. MS. No. 470 Agri. (A) dated 4-5-'58 sanctioned the extension of the scheme for the establishment of a Zonal Parasite Breeding

Station for the biological control of 'Nephantis serinopa' at Kasaragod for 2 years from 4-12-1956. The Scheme is partly financed by the Indian Central Coconut Committee. The period of extension of the scheme, sanctioned by the Government is due to expire on 3-12-'58.

For the past six years, good work has been carried out by this station by undertaking a detailed survey of the coastal belt in Malabar and Kasaragod. Intensified work in propaganda and control of 'Nephantis serinopa' on coconut were carried out throughout Malabar by the staff employed at the station besides catering to the needs of the coconut growers by way of supply of parasites for timely release and effective control of the pest attack. Intensive rearing of the main parasites were undertaken by the station throughout the year and have been released whenever the pest was seen in active form.

Since the pest is distributed throughout the District, it is necessary to continue the Parasite Breeding Station at Kasaragod for a further period of two years. I, therefore request that the concurrence of the Indian Central Coconut Committee may be obtained and sanction accorded for the further continuance of the Parasite Breeding Station, Kasaragod for 2 years from 4-12-1958 with the following existing staff.

Entomology Assistant	1 on Rs. 125-10-225.
Fieldman	1 on Rs. 40-100
Regular Mazdoors.	3 on Rs. 25-35.

The total cost for the continuance of the scheme for a further period of two years is estimated to Rs. 16,720/-. Of this, the State Government will have to bear 66 $\frac{2}{3}$ % of the recurring and the entire non-recurring expenditure. The share of the State Government thus works out to Rs. 11,547/- and that of the Indian Central Coconut Committee Rs. 5,173/-, for 2 years. The detailed financial implications for the continuance of the Scheme for 2 years from 4-12-1958 are furnished in the appendix. The pay and allowances of the staff have been calculated based on the scales of pay which existed up to 31-3-1958.



The expenditure for the scheme are to be debited to "40-Agriculture (e) Agricultural Experiments and Research (XXVIII) scheme for the biological control of coconut caterpillar pest".

I request that the Government may be pleased to address the Indian Central Coconut Committee for getting its concurrence for the continuance of the scheme and for sanction of the Committee's share of expenditure.

*Subject No. 22.* Comprehensive coconut nursery scheme, Andhra Pradesh—proposal for the extension of

The Indian Central Coconut Committee, at its 23rd Meeting (March 1956) had considered the Andhra Government's proposal for the extension of the above-mentioned scheme for a period of 3 years from 1-4-1956 and approved of it, subject to certain conditions including the one that the Committee's shares of the expenditure and the receipts should be limited to the proportions of 33½% and 40% respectively prescribed under the "General Conditions Applicable to grants made by the Indian Central Coconut Committee" then in force. The State Government, while accepting the Committee's conditions, however, accorded sanction for continuing the scheme for a period of one year only from 1-4-1956. The sanctioned period of the scheme thus expired on 31-3-1957. The State Government however, decided to continue the scheme for a further period of 4 years from 1-4-1957 and a statement of expenditure and receipts for the extension period furnished by the Director of Agriculture, Andhra Pradesh, in this connection is attached.

The following comments are offered on the statement of expenditure and receipts:—

1. According to the revised "General Conditions Applicable to grants made by the Indian Central Coconut Committee" the Committee's share of both the recurring expenditure and the receipts will be limited to 50% for the first 5 years; 33½% for the next 5 years and 15% for the



following 5 years. The three nurseries under the comprehensive scheme started functioning on 10-11-1948 and they will thus complete 10 years of operation on 9-11-1958. The Committee's share of recurring expenditure and receipts ( $33\frac{1}{3}\%$ ) for the period 1-4-1957 to 9-11-1958 is estimated on this basis at Rs. 18,236/- and Rs. 14,095 respectively and those for the period 10-11-1958 to 31-3-1961 at Rs. 10,331/- and Rs. 9,737/- respectively. The net expenditure to the Committee for the extension period will thus be Rs. 4,735/-.

2. Receipts from the sale of 52,500 seedlings per annum have been estimated for a period of four years only from 1-4-1957. The receipts anticipated, during the first year of the extension i. e., 1957-58 can only be those from the sale of seedlings raised in the year 1956-57. The receipt from the sale of seedlings raised in the last year of the extension scheme do not appear to have been taken into account by the Andhra Pradesh Government. As the Committee is meeting its share of expenditure on raising the last year's nursery, it is only appropriate that it should also be allowed to share the receipts in the accepted proportion, even though the sale of seedlings may take place after the termination of the scheme. A sum of Rs. 26,250/- may be expected as receipts during 1961-62 from the sale of 52,500 quality seedlings raised in the last year of the extension scheme. The Committee's share (15%) of the receipts will work out to Rs. 3,937/-.

On this basis, the Committee's share of net expenditure on the extension proposal will be of the order of Rs. 798 only.

The Sub-Committee may now decide whether they would sanction the extension of the scheme for a period of 4 years from 1-4-1957 at a net cost to the Committee not exceeding Rs. 798/-.

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## ANNEXURE

### Financial Statement of Comprehensive Coconut Nursery Scheme with effect from 1-4-1957 to 31-3-'61.

Share of expenditure and receipts of the Indian Central Coconut Committee and the Andhra Pradesh Government.

Part A. *Period with effect from 1-4-1957 to 9-11-1958.*

<i>Expenditure</i>	Pay of Establishment	13,787
	Dearness allowance	5,065
	T. A. and H. R. A.	3,505
	Other charges	38,392
	Total	<u>60,749</u>

Expenditure to be shared both by the Indian Central Coconut Committee and State Government. This excludes the expenditure on account of removing and Railway freight of the seedlings, which is borne entirely by the State Government.

Amount to be shared by the Committee at 33 $\frac{1}{3}$ % of Rs. 54,708	18,236
Share of the State Government at 66 $\frac{2}{3}$ % of Rs. 54,708	36,472

<i>Receipts</i>	Receipts excluding the amount realised by way of removing packing and railway freight on seedlings	42,286
	Share of the Committee at 33 $\frac{1}{3}$ % of Rs. 42,286	14,095
	Share of the State Government at 66 $\frac{2}{3}$ % of Rs. 42,286	28,191

Part B. *Period with effect from 10-11-1958 to 31-3-1961.*

<i>Expenditure</i>	Pay of Establishment	21,889
	Dearness allowance	7,511
	T. A. and H. R. A.	5,199
	Other charges	43,231
	Total	<u>77,830</u>

Expenditure to be shared both by the Coconut Committee and the State Government. This excludes the expenditure on account of removing and railway freight on seedlings which is borne entirely by the State Government 68,871

Amount to be shared by the Committee at 15% of Rs. 68,871 10,331

Share of the State Government at 85% of Rs. 68,871 58,540

*Receipts* Receipts excluding the amount realised by way of removing, packing and Railway freight on seedlings 64,914

Share of the Committee at 15% of Rs. 64,914 9,737

Share of the State Government at 85% Rs. 64,914 55,177

*Profit and Loss Account*

1. Committee Expenditure 28,567

Receipts 23,832

2. State Government Expenditure 95,012<sup>+</sup> \*15,000

Receipts 83,368<sup>+</sup>  
15,000

\* Rs. 15,000 are due to Railway freight, and packing.

*Subject No. 23.* Scheme for the maintenance of a collection block of representative varieties of coconut in Assam—proposal for the extension of.

The Indian Central Coconut Committee at its 17th meeting (April 1953) had sanctioned a Five-Year Scheme for the maintenance of a collection block of representative varieties of coconut palms at the Coconut Nursery, Kahikuchi (Assam). The object of the scheme was to establish a plantation of representative varieties of coconut found in India and abroad and study their performance under conditions obtaining in Assam so that



those that were found to be suitable could be used as a source of planting material for future distribution.

The scheme started functioning on 1-1-1954 and is due to terminate on 31-12-1958. The Government of Assam have now forwarded a proposal (copy attached) for the extension of the scheme for a further period of 5 years from 1-1-1958.

The following comments are offered on the proposal:—

1. So far fourteen varieties of coconuts have been planted in the block and their characteristics are being studied. Some more varieties are proposed to be collected and planted.

2. As before, the scheme will be run by the staff of the coconut nursery at Kahikuchi.

3. The total expenditure on the scheme is estimated at Rs. 10,490/- of which the non-recurring expenditure amounting to Rs. 5,500/- will be met entirely by the State Government. The recurring expenditure of Rs. 4,990/- is proposed by the State Government to be shared equally by the Committee and the Assam Government. According to the revised "General Conditions applicable to grants made by the Indian Central Coconut Committee", the Committee's share of recurring expenditure on "research", "nursery" and "co-operative" schemes is limited to 50% for the first 5 years and 33½% during the next five years. On this basis, the Committee's share of the recurring expenditure on the present extension scheme should be limited to 33½%. The Committee's share of expenditure in that case will be only of the order of Rs. 1,664/- (round).

The Committee may now decide whether the proposal for the extension of the scheme may be approved and if so, whether the Committee's contribution on the scheme may not be limited to 33½% of the recurring expenditure.

**Extension of the Scheme for the establishment and maintenance of a Collection Block of Representative varieties of Coconut in Assam for a period of Five Years (1958-1962-63).**

**Introduction:**— The scheme started operating from 1st January 1954 within the compound of the District Seed Farm at Kahikuchi, Assam. The work of the scheme is managed by the existing staff of the coconut Nursery Scheme, Kahikuchi under the supervision of the Horticulturist, Assam and overall control of the Director of Agriculture, Assam. The scheme is due to terminate on 31st December, 1958 (Reference I. C. C's letter No. F. 83 (i)/55 dated 28-8-1957 to the Government of Assam).

**Object:**— The object of the scheme is to establish a plantation of representative varieties of coconut of India and outside and to study their performances under condition obtaining in Assam. Those that will be found suitable will be used as a source of planting materials for a large scale multiplication and distribution in future in the State of Assam.

**Staff:**— It is proposed to run the scheme with the existing staff of the Coconut Nursery Scheme, Kahikuchi as before with no extra fund for the staff. The Horticultural Assistant, Coconut Nursery Schemes, Kahikuchi will be in charge of the scheme.

**Finance:**— The total cost of the period of Extension Scheme is estimated at Rs. 10,500/- from the year 1958-59 to 1962-63 (Refer detailed budget estimates). The share of the Indian Central Coconut Committee and that of the Assam Government are shown below:—

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	Non-recurring Rs.	Recurring Rs.	Total Rs.
1. Share of the Indian Central Coconut Committee-50%	—	2,495	2,495
2. Share of the Assam Government 50%	5,500	2,495	7,995
	5,500	4,990	10,490

*A brief review of the work done:*— So far, fourteen varieties of coconut have been collected and planted in the Nursery. Each variety is studied in detail in respect of height, girth and trunk, leaves and other characters for future identifications and performances. Apart from the plantation of the representative varieties a separate block for each of dwarf coconut and Assam tall varieties is being maintained to study their performances.

Different cultural operations such as hoeing, mulching, manuring and inter-cropping are being practised in these plantations.

*Programme of work.*

1. Collection of new varieties - to continue.
2. Maintenance of the block - to continue.
3. Different cultural practices manuring, inter-cropping cultivation etc., will be carried out - to continue.
4. Vacancies will be filled up - to continue.
5. Control measures against insect pests and diseases.
6. Study in relation to height, girth, suitability etc., to continue.

Scheme for the Maintenance of the Collection Block of Representative varieties of  
Coconut in Assam for 1958-59 to 1962-63.

A. Recurring expenditure to be borne by the State Government  
and I. C. C. C. on 50 : 50 basis.

Head	1958-59 1st 12 months					1960-61 12 months					1961-62 12 months					1962-63 12 months					Total
	Jan. 59 to March, 1959	Rs.	Rs.	Rs.	Rs.	Jan. 59 to March, 1959	Rs.	Rs.	Rs.	Rs.	Jan. 59 to March, 1959	Rs.	Rs.	Rs.	Rs.	Jan. 59 to March, 1959	Rs.	Rs.	Rs.	Rs.	
1. Cost of weeding and mulching (Labour)	300 00		500 00		500 00	300 00		500 00		500 00	300 00		500 00		500 00	300 00		500 00		500 00	2,300
2. Cost of raising a winter crop of Arahar or Cowpea and Retu crop (at Rs. 100-00 per acre) Labour	100 00		225 00		225 00	100 00		225 00		225 00	100 00		225 00		225 00	100 00		225 00		225 00	1,000
3. Cost of Irrigation (Labour)	100 00		150 00		150 00	100 00		150 00		150 00	100 00		150 00		150 00	100 00		150 00		150 00	650
4. Miscellaneous Expenditure including purchase of seed, seednuts, manure.	100 00		350 00		250 00	100 00		350 00		250 00	100 00		350 00		250 00	100 00		350 00		250 00	1,040
	600 00		1,225 00		1,125 00	600 00		1,225 00		1,045 00	600 00		1,225 00		1,045 00	600 00		1,225 00		1,045 00	4,990



Head	1958-59 1st Jan. 59 to March, 1959				1961-62 12 months		1962-63 12 months		Total
	1959-60 12 months	1960-61 12 months	1961-62 12 months	1962-63 12 months	1962-63 12 months	1962-63 12 months			
B. Non-recurring expenditure to be borne by the State Government alone.									
1. Cost of fencing for 5 acres of land	1,500 00	—	—	—	—	—	—	—	1,500
2. One labour shed	4,000 00	—	—	—	—	—	—	—	4,000
Total	5,500 00	—	—	—	—	—	—	—	5,500
Grand Total	6,000 00	1,225 00	1,125 00	1,045 00	995 00	995 00	995 00	995 00	10,490
Analysis									
1. Share of Indian Central Coconut Committee	300 00	612 50	562 50	522 50	497 50	497 50	497 50	497 50	2,495
2. Share of Government of Assam	5,800 00	612 50	562 50	522 50	497 50	497 50	497 50	497 50	7,995
	6,100 00	1,225 00	1,125 00	1,045 00	995 00	995 00	995 00	995 00	10,490

## APPENDIX II

### Secretary's Note

*Subject No. 8.* Working paper on Coconut research under the III, IV & V Five-Year Plans.

The Ministry of Food and Agriculture, Government of India, had in August 1957 requested this Committee to start advance thinking with a view to formulating suitable schemes for coconut development under the III, IV & V Five-Year Plans. The Governments of the coconut-growing States were accordingly requested to forward to the Committee suitable schemes as far as they were concerned.

In August 1958, the Government of India asked the undersigned to frame tentative proposals for coconut development in the office of the Committee itself saying that it was not necessary to consult the State Governments at this stage.

Tentative proposals formulated in this office were discussed with the officials of the Ministry of Food and Agriculture in Delhi in August 1958 and on the basis of these discussions separate proposals for coconut research and coconut development were framed and forwarded to the Ministry.

The Ministry prepared a working paper on coconut research on the basis of the proposals forwarded by this office and it was discussed at a meeting held in the Ministry on 5-9-1958.

The meeting felt that it should be possible to cut drastically the provision made for developing the Central Coconut Research Stations at Kasaragod and Kayangulam and for strengthening the office of the Committee at Ernakulam. It was also felt that provision for staff quarters at the Stations should be made on a moderate scale only and that only one new regional coconut research station need be established during the III Plan with location in the Andamans.

The proposals for developing the Central Coconut Research Stations at Kayangulam and Kasaragod under



the III Five-Year Plan were discussed by the undersigned with the Director of the former and Joint Director of the latter. The original proposals contained a provision of Rs. 8,13,200 for continuing under the III Plan the research work initiated under the II Plan and another provision of Rs. 17,90,800 for additional staff for undertaking new items of research work and construction of staff quarters. As it was highly essential to continue the research work started under the II Plan, the provision of Rs. 8,13,200 was decided to be retained. As regards additional items of work it was decided to get them done by the existing staff as far as possible. The original provision of Rs. 6 lakhs for construction of staff quarters was curtailed to Rs. 3 lakhs in the III Plan. The over-all provision of Rs. 26 lakhs made originally for the development of the Central Coconut Research Stations was thus reduced to Rs. 17.33 lakhs.

As regards the scheme for strengthening the office of the Committee under the III Plan the necessity for continuing the additional staff appointed in the office under the II Plan during the III Plan period also and for the extra staff proposed during the III Plan was pointed out to the Ministry and it was decided to retain a provision of Rs. 3 lakhs for this purpose. The provision of Rs. 7 lakhs made for the construction of an office building, purchase of a staff car etc. was however deleted. Thus out of the original provision of Rs. 10 lakhs, only Rs. 3 lakhs was retained.

As regards Regional Coconut Research Stations, it was originally proposed that besides continuing the existing research stations, a new station each be started in West Bengal, the Laccadives, the Andamans and Mysore. In the light of the Government of India's instructions it was decided to delete the provisions made for the stations in Mysore, West Bengal and the Laccadives.

A copy of the working paper on coconut research under the III, IV & V Five-Year Plans revised in the light of the Government of India's instructions and the above comments and forwarded to the Government of India, is attached to this note.



The Ministry of Food and Agriculture have now desired that the revised working paper on coconut research should be placed before the Committee and its comments communicated to them.

The subject may first be considered by the Agricultural Research and Development Sub-Committee (Research Wing).

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### **Working Paper on Coconut Research Under the Third, Fourth and Fifth Five-Year Plans.**

#### *Introduction:—*

India ranks second, after the Philippines, among the coconut growing countries of the world. Coconut plays an important part in the economic life of the people of the coconut growing areas. The palm is principally cultivated for its nuts from which are obtained copra, coconut oil, coconut oil-cake and coir fibre, all of which occupy an important place in the country's economic resources. The making and crushing of copra, the production of coir fibre and its manufacture into yarn, mats, mattings, etc., give employment to tens of thousands of persons in the regions in which these activities are carried on. The trunk of the mature tree provides good timber for the construction of houses, while its leaves, when plaited, constitute excellent waterproof thatching material. The shell is valued as a fuel and for the charcoal it yields. In fact there is no part of the tree which does not serve some purpose or the other.

2. India has an area of 15.87 lakhs of acres under coconut cultivation, producing 4,151 million nuts annually. More than 70% of the total area under coconut lies concentrated on the West Coast of India. It is in this area that the coconut industry is also organised best. Kerala is by far the most important coconut growing State in the country, accounting for about 66 per cent of the total coconut production in the country. Mysore, which contributes 14% of the total coconut production of the country comes next, followed closely by



Madras and Andhra Pradesh, which account for 10 per cent and 8 per cent of the total coconut production respectively. The other important coconut growing States are Bombay, West Bengal, Orissa, Assam and the Union territories of Andamans, Laccadive Islands, etc.

3. Although India is the second largest producer of coconuts in the world, she does not produce enough to meet her entire requirements of this commodity. During the last few years, imports of coconuts and its products have been steadily on the increase. Total imports, in terms of copra, in 1952-53, amounted to 52,037 tons and by 1955-56, these had risen to 1,16,709 tons representing an increase of over 100%. In 1956-57, the imports rose to 1,29,566 tons, worth Rs. 12.30 crores. Current imports are estimated to cost Rs. 15 crores per year. This works out to a deficit of about 33% in our requirements of coconut production, in terms of oil.

4. Obviously, it is in national interests that India becomes self-sufficient in her requirements of this commodity as expeditiously as possible thereby saving the much needed foreign exchange of the order of Rs. 15 crores per year. The object is to be achieved by improving the quality and yield of coconut in the country, through intensification of research and by passing on the successful results of research to the coconut growers in the field. The importance of the programme for intensification of research on the coconut can, therefore, be hardly over-emphasised.

**I. Assessment of the achievements during the First Five-Year Plan and also during the first two years of the Second Five-Year Plan with a view to specifically finding out the causes for lack of progress, if any.**

*a) Work done under the First Five-Year Plan.*

Coconut did not figure in the First Five-Year Plan. However, the Indian Central Coconut Committee, which came into existence in February, 1945, continued to tackle problems of fundamental research concerning coconut cultivation at its Central Coconut Research Station at Kasaragod (Kerala State) and to investigate

problems connected with the pests and diseases of coconut at the other Central Coconut Research Station at Kayangulam (Kerala State), as part of its *normal* activities. The Committee derives its revenues from the collection of cess at the rate of 4 annas per cwt. levied on copra (indigenous and imported) crushed in all power-operated mills in India, under the Indian Coconut Committee Act, 1944. The annual income of the Committee from cess is about Rs. 8 lakhs. The Committee also established Regional Research Stations, to undertake cultural and manurial experiments of local importance, in collaboration with the State Governments concerned. In 1955-56, there were 5 such Regional Research Stations - three in the former Travancore-Cochin State and one each in Bombay and Andhra. As a result, some useful work was done at the above research stations through evolution of improved methods of coconut cultivation, manuring and of pests and diseases control.

b) *Work done during the first two years of the Second Five-Year Plan.*

Realising the importance of coconut to the national economy, coconut research schemes estimated to cost an amount of Rs. 40.15 lakhs were included in the Second Five-Year Plan. Scheme-wise break-up of the Plan provisions is given below:-

- |   |                  |
|---|------------------|
| 1. Scheme for expansion of work at the Central Coconut Research Stations at Kasaragod and Kayangulam. | Rs. 15.77 lakhs. |
| 2. Schemes for setting up Regional Coconut Research Stations one each in Madras, Mysore and Orissa.   | Rs. 12.94 „      |
| 3. Scheme for correct estimation of area and yield statistics and cost of cultivation of coconut.     | Rs. 7.49 „       |
| 4. Scheme for setting up Parasite Breeding Stations, three in Madras, two each in Andhra, and         |                  |



Bombay and one in Kerala, to rear and liberate parasites for the biological control of <i>Nephantis serinopa</i> .	Rs. 2.95
5 Strengthening of the Secretariat of the Coconut Committee.	Rs. 1.00
Total	<u>Rs. 40.15 lakhs.</u>

The progress made during the first two years of the Second Plan has not kept pace with the schedule, in respect of all the schemes. However, the initial obstacles in the way of implementation of the schemes have been overcome and selection of sites, acquisition of land and preparation of plans and estimates for construction of buildings, completed in almost all cases. The Regional Research Station in Orissa was in operation in 1956-57. The Parasite Breeding Station, Kozhikode (Kerala State) started functioning in October, 1957. The additional staff required for the Secretariat of the Committee was also appointed.

## II. Appraisal of the likely achievements at the end of the Second Plan taking into account the existing organisational, material and financial resources available for development and also the progress so far achieved in the various schemes.

The preliminaries having been completed during the first two years of the Second Plan, the stage has been set for an accelerated progress in respect of all the schemes in the remaining three years of the Second Plan. The State Government of Kerala have taken steps to acquire the additional land required for the two *Central Coconut Research Stations* and this land is likely to be taken possession of by the stations in the course of the next few months. With the preparation of the plans and estimates for the ancillary structures at the two research stations (viz., glass house, pot culture house, insect-proof house, trainees' hostel, etc.,) the stage for actual construction work has been set. It is hoped that the construction of the structures would be completed during the remaining period of the Second



Plan. Of the three *Regional Coconut Research Stations*, the one in Orissa was in operation from the first year of the Second Plan, while the other two Research Stations in Madras and Mysore have started functioning during 1958-59. The technical programmes for the *Survey for Estimation of Area and Yield Statistics* of coconuts in the States of Kerala, Mysore, Madras, Bombay and Assam have been approved by the Government of India and the State Governments have initiated steps for undertaking the survey. The technical programme of the schemes for Andhra Pradesh and Orissa is being finalised. It is hoped that before the end of the Second Plan, the necessary surveys would have been conducted in the above-mentioned States.

Of the *eight Parasite Breeding Stations*, two stations, one at Nagercoil and the other at Gudiyattam (Madras) started functioning from April, 1958, and June, 1958 respectively. The Madras Govt. have dropped the proposal for the third station. One of the research stations in Andhra Pradesh started functioning on 1-4-1958 at Razole. The other station has not yet started functioning, but the State Government are taking steps to expedite the starting of this station. The breeding station in Kerala started functioning at *Kozhikode* in October, 1957. The two stations in the Bombay State have not yet started functioning. However, the Bombay Government have issued necessary instructions to the State Director of Agriculture to start the stations expeditiously.

As explained above, there has been some delay in starting some of the schemes. Although most of the schemes have by now started functioning, yet it is felt that it may not be possible for the Indian Central Coconut Committee to utilise the entire Plan provision of Rs. 40 lakhs and hence some of the incomplete work will have to be carried on to the Third Five-Year Plan.

**III. Requirements over the next three Plan periods and more specifically at the end of the third Five-Year Plan.**



#### IV. Targets for the next three Five-Year Plans and more definitely for the Third Five-Year Plan keeping in view the technical and organisational resources.

In order to attain self-sufficiency in our requirements of coconut production and to save the recurring outflow of money to the tune of Rs.15.0 crores per year, in terms of foreign exchange, it is essential that all our efforts and energies are devoted to the intensification of research on coconut. In a perennial crop like coconut with the life-period of about 80 years, the future plans have to be worked out on a long-term basis. A coconut seedling planted now will take about 10 years to give its normal fruiting, and another 5 years to give average production. The period from the 15th to the 50th year is the period of high productivity for the plant. From the 50th year it shows signs of deterioration and becomes totally unproductive by about the 80th year. It is, therefore, obvious that one has to wait for a number of years to get useful results of any research programme done on this crop. For instance, since the tree takes about ten years to give its normal fruiting, one has to wait for another ten years to get results from a breeding programme for this crop. On the manuring side, since it takes three years to get any increase in yield by manuring a coconut palm, any manurial experiments started on coconut will have to continue for a period not less than seven or eight years to get conclusive results. Thus it is not possible to get any immediate results from the research programme started on coconut. However, it is to be clearly understood that unless and until a start with the research programme is made and the foundation of research laid adequately, it may not be possible to get any results even after 20 or 25 years. All the same, results will come in the long run, which will have a definite bearing on our development programmes in the future Five-Year Plans for increasing our production. It is, therefore, in national interest that research programme in respect of cultural and manurial practices and also control of the pests and diseases, is intensified so as to produce better quality coconuts, with higher yields,

increasing the total production and thereby filling the present gap in our requirements.

With this end in view, the research work so far done has to be intensified and strengthened. The research activities have to be extended to cover fields, so far unexplored. Estimation of area and yield, as also the cost of production of coconut, have to be put on a scientific basis. Arrangements have also to be made to ensure a continuous flow of current statistics on the demand and supply position of copra and coconut oil in the important producing and consuming centres. Data on price trends, market arrivals, movements of stocks of coconuts and coconut products have also to be collected regularly and analysed. Provision has also to be made for development of co-operative marketing of coconut and its products, organisation of the regulated markets etc. Construction of office and residential buildings is also essential, if fruits of the above activities are to be fully utilised.

**V. Priorities, policies, measures and machinery for achieving both the short term and long term objectives of agricultural development.**

In order to achieve the objective referred to above, research work will have to be intensified on the following lines:

- (i) *Strengthening and expansion of work at the Central Coconut Research Stations, Kasaragod and Kayangulam.*

**A. Central Coconut Research Station, Kasaragod.**

The present research programme will have to be continued under the Third Plan. Besides, the following new items of work are proposed to be taken up during the Third Plan period:—

- a) Study of induction of polyploidy in coconut by treating with chemicals like colchicine etc. It may be mentioned that polyploidy is likely to increase yield and size of nuts.
- b) Development of dwarf palms, which lend to easy picking of nuts.



Research on coconut, a perennial crop, is a continuous process and cannot be terminated after a certain number of years. The programme of work drawn up for the research station at the time it was set up as well as the items of work programmed to be carried out under the Second Five-Year Plan scheme are to be continued during the Third Five-Year Plan period also. Besides, some more new items of work have to be taken up during the Third Plan period. Only the bare minimum of staff has now been proposed for the new items of work and the services of the present staff will be utilised to the maximum. The revised proposals involve an expenditure of Rs. 4,56,000 and the total cost including the cost of continuing the Second Plan Schemes during the Third Plan period would come to Rs. 8,41,000 only as against the sum of Rs. 18,49,000 proposed earlier. This includes also a moderate provision of Rs. 2 lakhs for staff quarters in place of the Rs. 4 lakhs originally proposed.

*B. Central Coconut Research Station, Kayangulam*

As stated with regard to the Kasaragod Station, the research work on pests and diseases etc. of the coconut palm in the Kayangulam Station is a continuous process and cannot be terminated after a certain number of years. It is very necessary, therefore, that the Second Five-Year Plan schemes are continued under the Third Plan also for which an amount of Rs. 4,28,200 is provided.

Besides continuing the current research programmes, the following new items of work are proposed to be taken up:

- a) Investigations on the control of the Red Palm Weevil.
- b) Investigation on the stem bleeding disease of the coconut palm.
- c) Virus investigations and the root (wilt) diseases of the coconut palm.
- d) The effect of water-logging on the incidence of the coconut diseases.

For this, the Research Station would have to be provided with additional land for experimental purposes,

as also limited additional staff to cope with the increased volume of technical and office work. Provision of quarters for the staff is also essential. Most of these items of work are proposed to be carried out with the normal staff of the Station. So the provision for additional staff under the Third Plan has been considerably curtailed. The total provision for the Third Plan is now only Rs. 4,64,100 which includes also a moderate provision of Rs. 1,00,000 for staff quarters instead of Rs. 2,00,000 originally proposed. Thus the overall total provision for the Third Plan for this Station has now been reduced from the original provision of Rs. 12,56,000 to only Rs. 8,92,300.

(ii) *Continuance of the existing Regional Research Stations and establishment of new ones.*

Three Regional Research Stations, one each in Mysore, Madras and Orissa, have already started functioning during the Second Plan. These will have to be continued in the third and successive Plans also. The Regional Coconut Research Stations sanctioned by the Committee for Andhra Pradesh, Bombay and Assam also will have to be continued under the III Plan as the normal resources of the Committee are found too inadequate for financing these.

*Andamans.*

No experimental data on manurial and cultural practices relative to local conditions is available at present to guide the agriculturist. It is, therefore, proposed to conduct manurial and cultural experiments under local conditions to prescribe the proper dosage and time of application of manures to coconut palms of varying ages. The results will be passed on to the coconut growers as they become available. It is, therefore, proposed to set up a regional research station in Andamans in the Third Plan.

*Scheme for the investigation of diseases.*

The Government of India have approved, in principle, the inclusion in the Second Plan of a scheme for the investigation of the diseases of coconut palm in Andhra



Pradesh. The detailed scheme is being prepared in consultation with the State Government. It is expected that the scheme will, after approval by the Government of India, be implemented shortly. It will be essential to continue this scheme during the Third Plan also.

### *Technological Research Schemes.*

The Committee is not, at present, undertaking any technological research on coconut. It is, however, essential that technological research work is undertaken by the Committee, with a view to utilising the coconut products more effectively in the country. Hence provision for these schemes has to be made in the Third Plan.

#### *Survey for correct estimation of area and yield and cost of production of coconut.*

Surveys for the correct estimation of area and yield of coconuts in the coconut growing States and studies on the cost of cultivation of coconut in Kerala would be conducted under the Second Plan. These surveys will have to be continued under the Third Plan also, as these statistics form the basis for assessment of the results of the development schemes on coconuts. Further these surveys would provide the basic data for future planning.

### *Marketing and Economic Research*

In addition to the above surveys and studies, arrangements have to be made to ensure a continuous flow of current statistics on the demand and supply position for copra and coconut oil in the important producing and consuming centres. Data and price trends, market arrivals, movements of stocks of coconuts and coconut products have to be regularly collected and analysed. It is also necessary to organise co-operative marketing of coconut and its products, as also regulated markets. It is, therefore, proposed to start a Marketing and Economic Research Section at the Secretariat of the Committee.

### *Strengthening of the headquarters of the Committee*

In order to cope with the increased volume of work under the Third Five-Year Plan consequent on the Committee taking over responsibility for the execution of the development schemes in addition to research schemes the staff appointed in the Secretariat of the Committee under the II Plan will have to be continued under the III Plan and some additional staff appointed during the III Plan.

*Estimate of the financial resources both external and internal needed for implementing the programmes required for achieving the targets during the Third Five-Year Plan period.*

Provision of an amount of Rs. 51,02,316 is considered essential for carrying out the programme proposed above.

The scheme-wise break-up of the expenditure is shown below:

Name of the Scheme	Amount required
1. Scheme for strengthening the Central Research Stations.	
(a) Kasaragod	Rs. 8,41,000
(b) Kayangulam	Rs. 8,92,300
2. Regional Research Stations.	
(i) Mysore	Rs. 2,71,792
(ii) Madras	Rs. 1,53,576
(iii) Bombay	Rs. 1,19,854
(iv) Andhra	Rs. 2,37,290
(v) Orissa	Rs. 2,17,736
(vi) Assam	Rs. 1,37,200
(vii) Andamans	Rs. 1,31,868
3. Technological Research Schemes	Rs. 10,00,000
4. Survey for estimation of area and yield and studies for estimating cost of production	Rs. 6,00,000
5. Marketing and economic research	Rs. 2,00,000
6. Strengthening of headquarters of the Committee	Rs. 3,00,000
Grand Total	<u>Rs. 51,02,316</u>



*Provision for Fourth and Fifth Plans.*

The programme of work would be more or less on the lines as proposed for the Third Plan. Some additional provision may have to be made on the construction side. The total provision for the 4th Plan may be about Rs. 80,00,000 and that for the 5th Plan about Rs. 90,00,000.

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### APPENDIX III

#### Secretary's Note

*Subject No. 12.* Progress report on the Central Coconut Research Station, Kayangulam, for the year ended 30-6-1958.

A copy of the progress report on the Central Coconut Research Station, Kayangulam for the year 1957-58 received from the Director of the Station is attached to this note. As usual, a summary of the report has been sent to the Indian Council of Agricultural Research for scrutiny by the concerned Scientific Committees of the Council.

The entomology section of the progress report for the year ended 30-6-1957 was considered by the Entomology Committee of the Indian Council of Agricultural Research at its meeting held in February 1958 and that Committee desired that the phenology of *Nephantis serinopa* should be studied in relation to the parasite population, and that the formulation used in the spraying by BHC should be given. The Director, Central Coconut Research Station, Kayangulam, to whom the comments were conveyed, replied saying that the study of the phenology of *Nephantis serinopa* is being carried out in the scheme under the Second Five-Year Plan and that the concentration of BHC used for spraying breeding places of rhinoceros beetle is 0.1 per cent. The Indian Council of Agricultural Research has been informed accordingly.

The total yield of ripe coconuts obtained during the year was 79,125 as against 79,075 obtained during the

previous year. The price obtained for the coconuts ranged from Rs. 160 to Rs. 254 per 1,000.

During the year under report 750 seed coconuts were procured from Nagercoil and sown in a nursery at the Station, and 582 seedlings were sold to local cultivators during the period. This work is not, however, included in the approved technical programme of work of the Station.

In my note on the progress report on the Station for the year ended 30-6-1957, it had been mentioned (1) that 86 males and 138 females of the wasp *Scolia oryctophaga*, a parasite of the rhinoceros beetle, were received at the Station from the Director of Agriculture, Mauritius, in August-September 1957, (2) that after a month's egg-laying, the insects that were still alive (30 females and 4 males) were liberated and (3) that the Director of Agriculture, Mauritius had agreed to send a few more consignments of the insects in July 1958. It is reported that the insects laid a total number of 541 eggs, of which 360 hatched. Out of the 360 larvae, 265 pupated. But even after 9 months, no adults emerged from the pupae. The Director of Agriculture, Mauritius has subsequently intimated his inability to send further consignments due to scarcity of the insects there.

The present position regarding the construction works at the Station under the scheme for the development of the Station under the Second Five-Year Plan, is indicated below.

1) *Construction of Insectory and Pot Culture House.*

The Central Public Works Department have awarded the work to a contractor on 5-12-1958. The work is expected to be started soon.

2) *Construction of a Meteorological tower.*

The Central Public Works Department awarded the work to a contractor on 8-10-1958. The work is progressing satisfactorily.

3) *Insect-proof House.*

The construction of the building was over and handed over to the Director, Central Coconut Research



Station, Kayangulam by the Central Public Works Department on 5-11-1958. Arrangements for starting research work in the insect-proof house are being made.

The technical staff sanctioned for the Station under the scheme for the development of the Station under the Second Five Year-Plan were appointed in March 1958.

The report may be considered first by the Agricultural Research and Development Sub-Committee (Research Wing).

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## **Annual Report of the Central Coconut Research Station, Kayangulam. (1-7-1957 -- 30-6-1958).**

### *Introduction*

The Central Coconut Research Station at Kayangulam deals with investigations on the pests and diseases of the coconut palm. The important pests of the coconut are the rhinoceros beetle, the leaf eating caterpillar and the palm weevil. There are a number of other pests prevalent on coconut causing damage to a lesser extent, than the three mentioned above. Of the diseases of the coconut the leaf-rot and the root (wilt) disease are of considerable importance, and form the main items of investigation. The Station has at present four sections, viz., Entomology, Pathology, Physiology and Chemistry.

### **Administrative and General**

#### *A. Administrative*

##### *1. Appointments and promotions*

Shri Thomas Kappan assumed charge as Assistant Administrative Officer on 18-11-1957. Shri G. Ravindra Das, who was transferred from the office of the Secretary, Indian Central Coconut Committee, Ernakulam, joined duty on 2-11-1957. Dr. Chandy Kurian assumed charge as Entomologist on 3-1-1958. Shri K.J. Thommen joined duty as Research Assistant (Grade II) on 15-1-'58. Sarvashri K. A. Varghese, P.K. Pavithran, R. Chellappan Pillai and M. T. Ayyappan, assumed charge as Selection Grade Fieldmen on 1-3-1958. Kumari V. G. Lilly assumed charge as Research Assistant (Grade I) on

1-3-1958. Sarvashri M. K. Chandrasekharan Nair and M. Rajappan Chettiar joined duty as Research Assistant (Grade II) and Laboratory Assistant respectively on 1-3-1958. Shri T. S. Sibiliman Rawther joined duty as Research Assistant (Grade I) on 10-3-1958. Shri J. Antony assumed charge as Research Assistant (Selection Grade) on 29-3-1958. Shri K. Mathen joined duty as Research Assistant (Grade I) on 2-6-1958. Shri U. Sukumaran was put in additional charge of the duties of the Office Assistant during the period of earned leave of Shri M. Mathews, Office Assistant, for 46 days from 16-6-1958.

*Under the Second Five-Year Plan.*

Dr. K. Radha assumed charge as Assistant Plant Pathologist on 3-1-1958.

The undermentioned staff joined duty in their respective posts on the dates mentioned against their names.

<i>Name</i>	<i>Designation</i>	<i>Date of joining</i>
1. Shri C. M. Joseph	Research Assistant (Grade I)	1-3-1958
2. „ G. Bhaskara Pillai	do.	do.
3. „ K. J. Thomman	Research Assistant (Grade II)	do.
4. Miss T.O. Prasanna Kumari	do.	do.
5. Shri Chacko Mathew	do.	do.
6. „ T. Abraham Thomas	do.	do.
7. „ Robert Cecil	do.	do.
8. „ V. C. Kurian	Laboratory Assistant	do.
9. „ C. P. Ramachandran	do.	do.
10. „ K. Patchu Pillai	Fieldman	do.
11. „ Thomas Varghese	do.	do.
12. „ K. J. Michael	do.	do.
13. „ K. Gopinathan Pillai	do.	do.
14. „ Peethambaran Channar	do.	do.
15. „ P. K. Atchutha Menon	do.	do.
16. Miss M. Maheswari Pillai	do.	do.
17. Dr. (Miss) P. Shanta	Assistant Virus Pathologist	3-3-1958



- |                           |                    |           |
|---------------------------|--------------------|-----------|
| 18. Shri K. Kochukrishnan | Artist Photo-      | 6-3-1958  |
| Achary                    | grapher            |           |
| 19. Shri A. S. Mathew     | Research Assistant | 14-3-1958 |
|                           | (Grade II)         |           |
| 20. „ T. R. Varghese      | Clerk              | 30-4-1958 |

## 2. *Transfers.*

Kumari K. K. Sarojini Devi, Clerk, was transferred to the office of the Secretary, Indian Central Coconut Committee, Ernakulam on 31-10-1957. Shri N. G. Pillai, Research Assistant (Grade II), was relieved of his duties here on 28-2-1958 to join duty as Research Assistant (Grade I) at the Central Coconut Research Station, Kasaragod. Shri K. A. Varghese, Selection Grade Fieldman, was relieved of his duties here on 4-3-1958 to join duty as Assistant at the Central Coconut Research Station, Kasaragod, under the Seednut Procurement Scheme.

## 3. *Relinquishments.*

Shri T. P. Raman, Laboratory Assistant, was relieved on 23-9-1957 to take up appointment under the Kerala Government. Shri Bhaskara Varma Thampan, Clerk was relieved on 10-10-1957 to take up appointment under the Kerala Government. Shri K. J. Thommen, Research Assistant (Grade II), was relieved of his duties on 30-12-1957 on expiry of the term of appointment. (He rejoined duty on 15-1-1958 and the break period of his service was condoned by the President of the Committee). Shri A. P. Anandan, Research Assistant (Grade I), was relieved of his duties on 8-1-1958 to take up appointment under the Kerala Government. Shri T. Abraham Thomas, Research Assistant (Grade II), who was appointed under the Second Five-Year Plan, was relieved on 10-5-1958 to take up appointment under the Kerala Government.

## 4. *Leave.*

The undermentioned members of the staff availed of earned leave for the period noted against their names.

<i>Name</i>	<i>Designation</i>	<i>Period of leave</i>	
Shri R. Chellappan Pillai	Fieldman	25 days from	8-7-1957
„ Thomas Kappan	Office Supdt.	41 „	21-8-1957
„ M. P. Sankaranarayanan	Research Asstt. (Grade I)	20 „	23-9-1957
„ P. V. Kunjan	Laboratory Asstt.	45 „	2-1-1958
„ P. V. Channey	do.	20 „	17-3-1958
„ P. V. George	Head Assistant	41 „	5-4-1958
		16	16-5-1958
„ P. K. Pavithran	Fieldman (Selection Grade)	30 „	15-5-1958
„ M. P. Sankaranarayanan	Research Asstt. (Grade I)	10 „	5-6-1958
„ K. N. Sahasranaman	Farm Assistant	15 „	9-6-1958
„ M. Mathews	Office Assistant	46 „	16-6-1958

Dr. K. Radha, Assistant Plant Pathologist (under the Second Five-Year Plan), availed of 3 months' maternity leave from 24-3-1958.

#### 5. *Research Workers.*

Dr. P. Somasekhar, National Research Fellow, who was working in the Entomology Section resigned his Fellowship on 4-10-1957 to take up the post of Entomologist under the Indian Coffee Board.

Kumari P. G. Valsala joined duty as Honorary Research Worker in the Entomology Section on 10-10-1957.

#### 6. *Training.*

Shri M. P. Sankaranarayanan, Research Assistant (Grade I), underwent training in the All India Soil and Land Use Survey conducted at Dehra Dun by the Indian Agricultural Research Institute from 15-4-1958 to 10-5-1958.

Thirty-eight supervisors under the Spraying Scheme and 46 Gram Sevaks under the services of the Kerala Government were given training in the control of pests and diseases of coconut.

#### 7. *Research Workers' Conference.*

Dr. K. P. V. Menon, Director, and Dr. Chandy Kurian, Entomologist attended the Mycological and Entomological Research Workers' Conference respectively held at Simla during June, 1958.



## General

### 1. *Season and Rainfall.*

The total rainfall received during the period under report was 2,833.3 mm in 142 days as against 2,153.9 mm spread over 115 days during the previous year.

### 2. *Farm operations.*

*Cultural:* Piling of mounds was done during September-October and levelling the same was carried out during December-January. The garden was raked plot by plot and the weeds collected and burnt. During May, 1958 the plots were ploughed twice and the green manure seeds *Crotalaria juncea* and *C. striata* were sown broadcast and raked into the soil.

*Manuring:* On an average 4,800 lb. of green manure was applied per acre. The manure was applied in ring trenches taken round individual trees. The trees in Blocks II, III and IV which are under the micronutrient manurial experiment received groundnut cake, sulphate of potash and bone-meal at 660 lb., 200 lb. and 192 lb per acre respectively, in addition to the green manure. All the other palms were given 7 lb. of groundnut cake, 2 lb. of muriate of potash and 2 lb. of bone-meal per tree besides the green manure.

*Harvest:* There were 8 harvests during this period. A total of 74,125 coconuts were obtained as against 79,075 nuts harvested during the previous year.

### 3. *Nursery.*

750 seednuts were procured from Nagercoil, a disease free area and were sown in the nursery in May, 1958. 100 nuts collected from the station garden were also sown in the nursery.

### 4. *Underplanting.*

47 dwarf seedlings were planted in Block VI and the gaps in the previous year's underplanting were filled up.

### 5. *Supply of seedlings.*

582 seedlings were sold to local cultivators during this period.

6. *Coconut market.*

The highest price obtained for coconut during the year was Rs. 254 per 1000 in April, 1958 and the lowest was Rs. 160 per 1000 in July, 1958.

7. *Other crops.*

Areca nut palm is the only other crop grown in the farm. There are 290 adult palms and about 300 seedlings were planted during the year.

8. *Supply of green manure seeds.*

66 lb. of *Crotalaria striata* seeds were sold during the year.

9. *Lay out.*

The boundary bunds and the bunds between the plots were strengthened whenever it was found necessary. The gaps in the live hedges were also filled up.

10. *Glyricidia week.*

'Glyricidia' week organised by the Kerala Government was observed at this Station also in June, 1958. About 2,000 cuttings from previous plantings at this Station were planted along the boundary.

11. *Petty construction and repairs.*

Maintenance work of the laboratory building, the Rest House and the usual thatching and white washing of the residential quarters were done in time. No construction work was taken up this year.

## **Approved Technical Programme**

### **Entomology**

#### **I. *Oryctes rhinoceros* L.**

1. General survey to be continued in other coconut growing areas.
2. Biology.
3. Ecological studies.
4. Insecticidal control.
5. (a) Biological control, including the study of the biology and bionomics of the imported parasites and predators.  
(b) Search for indigenous parasites and predators.



II. *Nephantis serinopa* Meyr.

1. General survey to be continued.
2. Biology.
3. Study of the population of the pest and its parasites in relation to ecological conditions.
4. Insecticidal control.
5. Biological control *Platymeres rhadamanthus* – possibility of this being tried against *N. serinopa*.

III. *Rhyncophorus ferrugineus* F.

1. General survey.
2. Biology and bionomics.
3. Symptomatology studies.
4. Insecticidal control – including systemic insecticides.
5. Search for parasites and predators.

IV. *Leucopholis coneophora* Burm.

1. General survey.
2. Biology and ecology.
3. Insecticidal trials.
4. Search for parasites and predators.

V. *Investigations of minor pests.*

Minor pests particularly *Contheyla rotunda*, *Macroplectra nararia*, Termites, Coccids and Nematodes are to be studied in detail.

*Rats and Bats* – control measures to be further investigated.

Pathology

VI. *Leaf Disease.*

1. Incidence of infection in relation to nutrient deficiencies.
2. Nutritional effect of urea applied as spary.
3. Effect of manuring with and without fungicidal spray.
4. Comparative efficacy of different fungicides.
5. Effect of summer irrigation.
6. Varietal resistance of coconut to *Helminthosporium* infection.

VII. *Root (wilt) Disease.*

1. Infection experiments with fungi associated with the disease.
2. Fungal infection in relation to waterlogged/acidic condition.
3. Studies on the rhizosphere microflora.
4. Investigations on the occurrence of *Rhizoctonia solani* in roots in relation to the condition of the palms and the roots.

VIII. *General.*

1. Role of seednuts in carrying the disease.
2. Intensive manuring cum spraying.

IX. *Investigations in Virus Pathology.*

1. Survey of insect population in coconut gardens.
2. Disease transmission trials under controlled conditions.
3. Histological studies.
4. Host range studies.

**Plant Physiology**

X. *Physiological investigations.*

1. Studies on the disease symptom and the rate of deterioration of the palm due to disease.
2. Micronutrient manurial experiment.
3. Injection trials.
4. Anatomical studies.
5. Study of deficiency symptoms in coconut seedlings.
6. Studies on root exudation.
7. Inducing aerial roots for feeding diseased palms.
8. NPK exhaust by coconut.
9. Studies on the translocation and accumulation of food.
10. Transpiration studies.
11. Studies on coconut root system.
12. Miscellaneous investigations.



## Chemistry

### XI. Chemical investigations.

1. Study of soils of healthy and diseased coconut areas of Travancore-Cochin.
2. Studies on soil moisture.
3. Studies on waterlogged soils for accumulation of soluble salts and the effect of salinity on disease.
4. Manurial experiments.
5. Examination of tissues of healthy and diseased palms.
6. Studies on seasonal foliar yellowing.
7. Advisory.

## Entomology

Among the pests of the coconut palm the rhinoceros beetle, (*Oryctes rhinoceros* L.), the leaf eating caterpillar (*Nephantis serinopa* Meyr.), the palm weevil (*Rhynchophorus ferrugineus* F) and the cockchafer beetle (*Leucopholis coneophora* Burm.) are the most important. Heavy infestation of some of the minor pests like *Contheyla rotunda* H, *Parasa lepida* Cram, and *Macroleptena nararia* Moore, was observed during this period. Other pests which commonly occurred were the nursery pests, like termites *Odontotermes obesus* Ram, the leaf rolling caterpillar *Gangara thrysis* Moore and nematodes, the pests of the inflorescence, *Cyclodes omma* V. and *Batrachedra arenosella* Walk, and other miscellaneous pests like *Suastus gremius*, *Diocalandra stigmaticollis*, *Aspidiotus destructor*, etc. The mamalian pests such as rats and flying-foxes were also common. The common pests of copra observed during this period were *Tribolium castaneum*, *Necrobia rufipes*, *Trogoderma granaria*, etc.

General survey of the major pests, investigations on the biology and the most effective and economic methods of control of the pests were the main items of work carried out in the Entomology Section.

# I. *Investigations on the rhinoceros beetle (Oryctes rhinoceros L.)*

## 1. *General survey.*

*Object:* To study the occurrence, distribution and intensity of pest attack in Kerala.

*Previous work:* The survey was conducted in the earlier years also. The pest attack was found to be high in places where breeding materials like decaying vegetable matter were in plenty.

*Present work:* The survey on the occurrence and distribution of the beetle showed that only one species of *Oryctes*, viz., *rhinoceros* occurred in Kerala and it was prevalent throughout the State. The population of the pest was high in palm groves which provided plenty of breeding materials in the form of dead coconut trunks, stumps and shed leaves.

## 2. *Biology.*

*Object:* To gain information on the different stages of the pest, in order to devise effective control measures.

*Previous work:* Life cycle of the pest was studied in detail for confirmation of the earlier results.

*Present work:* Life history studies of the pest showed that the period of the different stages of the beetle was more or less similar to the observations recorded earlier.

The sex ratio of the beetle was studied and the data collected during the last three years are as follows:—

Sex ratio	1955-'56	1956-'57	1957-'58
Male : Female	1.0 : 1.25	1.01 : 1.0	1.3 : 1.0

## 3. *Ecological studies.*

*Object:* To correlate the environmental conditions with the abundance of the pest.

*Previous work:* Feeding habits of *O. rhinoceros* larvae were under observation.

*Present work:* Feeding habits of both the adult and the larvae of the beetle were studied. The adults tunneled about 30-40 cm. deep into the crown of the palm. Grubs were observed in the decayed and crumbled soft wood.



#### 4. *Insecticidal control.*

*Object:* To study the effect of various insecticides in controlling the pest.

##### (a) *Laboratory trials.*

*Previous work:* The effect of different concentrations of Aldrin and Chlordane on *Oryctes* larvae was studied.

*Present work:* Effect of Lindane, Malathion and Heptachlor and residual toxicity of Chlordane were studied.

##### (i) *Effect of Lindane.*

The insecticide used was a sample of 25 per cent wettable powder containing 99-100 per cent gamma isomer. The treatments were 0.001, 0.0025, 0.005, 0.0075 and 0.01 per cent of Lindane in 2000 gm. of air dried cow dung. The moisture content of the mixture was maintained at 20-30 per cent of the water-holding capacity of cowdung. Each treatment was replicated five times. Fully grown grubs of *Oryctes* were introduced into the insecticidal mixture, 10 for each replicate.

Observations were recorded on the condition of the grubs at 24 hours interval up to a period of 7 days (Table I).

**TABLE I**  
Toxicity of Lindane against *O. rhinoceros* larvae

Treatments	Effect after 24 hours			Effect after 7 days		
	Percentage of grubs.			Percentage of grubs.		
% Lindane.	Normal.	Paralysed.	Dead.	Normal.	Paralysed.	Dead.
0.001	26.7	73.3	Nil	Nil	23.3	76.7
0.0025	16.66	76.66	6.66	Nil	20.0	80.0
0.005	Nil	90.0	10.0	Nil	20.0	80.0
0.0075	Nil	83.3	16.7	Nil	13.4	86.6
0.01	Nil	90.0	10.0	Nil	10.0	90.0
Control	100	Nil	Nil	96.7	Nil	3.3

As seen from Table I, Lindane is effective (after 7 days' contact) against rhinoceros larvae even at the lowest concentration tested, namely 0.001 per cent. The toxicity increases with increase in the concentration of the insecticide and contact period of the grubs with the insecticidal mixture.

(ii) *Effect of Malathion.*

The trial was conducted as in the case of Lindane. Experimental results show that Malathion is not toxic towards rhinoceros larvae after 24 hours contact at the concentrations tested. Even after 7 days contact only 13 to 23 per cent of the grubs were dead at the higher three concentrations of Malathion and none in the lower concentrations, viz. 0.001 and 0.0025 per cent; none of the grubs in any treatment were found paralysed.

TABLE II

Showing the toxicity of Malathion towards  
*O. rhinoceros* larvae.

Treatments % of Mala- thion.	Effect after 24 hours Percentage of grubs.			Effect after 7 days Percentage of grubs.		
	Normal.	Paralysed.	Dead.	Normal.	Paralysed.	Dead.
0.001	100	Nil	Nil	100	Nil	Nil
0.0025	100	Nil	Nil	100	Nil	Nil
0.005	100	Nil	Nil	76.7	Nil	23.3
0.0075	100	Nil	Nil	86.7	Nil	13.3
0.01	100	Nil	Nil	86.7	Nil	13.3
Control	100	Nil	Nil	96.7	Nil	3.3

(iii) *Effect of Heptachlor.*

The experiment was conducted as in the previous two trials (i and ii) but the strengths of the insecticide tested were 0.01, 0.025, 0.05, 0.1 and 0.2 per cent. After 24 hours contact none of the grubs in any of the treatments were dead. However, the percentage of paralysis ranged from 3.3 to 33.3. With increase in the period of



contact with the insecticide the toxicity also increased. Thus after 7 days contact only 3.3 per cent of the grubs at 0.01 per cent Heptachlor remained normal and the rest of the grubs in all the other treatments were either dead or paralysed. (Table III).

**TABLE III.**

Showing toxicity of Heptachlor towards  
*O. rhinoceros* larvae.

Treatments % Hepta- chlor	Effect after 24 hours Percentage of grubs			Effect after 7 days Percentage of grubs		
	Normal	Paralysed	Dead	Normal	Paralysed	Dead
0.01	96.7	3.3	Nil	3.33	43.33	53.33
0.025	83.3	16.7	Nil	Nil	36.7	63.3
0.05	66.7	33.3	Nil	Nil	33.3	66.7
0.1	66.7	33.3	Nil	Nil	23.3	76.7
0.2	70.0	30.0	Nil	Nil	13.3	86.7
Control	100	Nil	Nil	93.4	Nil	6.6

(iv) *Residual toxicity of Chlordane.*

*Object:* To find out how long the insecticide Chlordane mixed in cowdung remains potent under laboratory conditions.

*Previous Work:* The toxicity of Chlordane at concentrations of 0.01, 0.025, 0.05, 0.1 and 0.2 per cent in cowdung towards *O. rhinoceros* larvae was studied. The toxic effect of Chlordane was found to increase with increase in its concentration in the mixture and the period of contact of the grubs with the mixture.

*Present Work:* Different concentrations of Chlordane, viz. 0.01, 0.025, 0.05, 0.1 and 0.2 per cent in cowdung were prepared as in the earlier trials. The mixture was stored in glass containers. An untreated control, i. e. cowdung alone was also maintained. Six months after storage the toxicity of the Chlordane in the mixture was tested as in earlier experiments (i, ii and iii).

The insecticide remained potent after six months as shown by the data in Table IV. Although none of the grubs died after 24 hours contact 22 to 52 per cent of them were paralysed, while in the control all the grubs remained normal. After 7 days contact the percentage mortality ranged from 30 to 65 per cent and 30 to 52 per cent of the larvae were paralysed. Even the lowest concentration of the insecticide namely 0.01 per cent was lethal to a certain extent.

**TABLE IV.**  
Residual toxicity of Chlordane.

Treatments % of	Effect after 24 hours contact			Effect after 7 days contact		
	Percentage of grubs			Percentage of grubs		
Chlordane	Normal	Paralysed	Dead	Normal	Paralysed	Dead
0.01	100	Nil	Nil	40.0	30.0	30.0
0.025	77.5	22.5	Nil	12.5	52.5	35.5
0.05	65.5	35.5	Nil	5.0	42.5	52.5
0.1	50.0	50.0	Nil	Nil	35.0	65.0
0.2	47.5	52.5	Nil	Nil	35.0	65.0
Control	100	Nil	Nil	95	Nil	5.0

(b) *Field trials.*

*Experiment:* Prophylactic treatments against the beetle attack.

*Object:* To study the comparative effect of BHC and Chlordane in different combinations in checking the beetle attack.

*Previous work:* 226.8 gms. BHC and Chlordane were mixed with an equal quantity of sand or sawdust and were applied in the inner-most two or three leaf axils of palms under treatment twice a year. Incidence of beetle attack was recorded once a month.

*Present work:* The experiment which was in progress was continued.



*Results:* Observations were recorded on the incidence of pest attack every month. The average value of the pest infestation during the period under report in each treatment is as follows:—

<i>Treatment</i>	Percentage of beetle attack in	
	<i>Treated</i>	<i>Control</i>
BHC + sand	3.3	8.3
BHC + sawdust	Nil	8.3
Chlordane + sand	8.3	8.3
Chlordane + sawdust	7.5	8.3

Experimental results indicate that BHC controls the beetle attack more effectively than Chlordane.

*Experiment ii. Field trial to control the beetle attack.*

*Object:* To study the effectiveness of trap pits and spraying the breeding places in coconut gardens with BHC suspension as a control measure against rhinoceros beetle attack.

*Previous work:* The experiment was started in 1955 in a block of 6.35 acres (2.57 hectare) with a standing crop of 428 palms. Fifteen trap pits each of size 4 x 2½ x 1 ft. (1.22 x 0.76 x 0.31 m) filled with cowdung and decaying vegetable matter were provided in the block. Of these 3 served as untreated control and the remaining 12 pits were sprayed with BHC suspension at the rate of 12.8 oz. (362.87 gms) per pit. The breeding places inside the block and within a belt of 200 yds. (182.88 m) also were similarly treated with BHC. Another plot far away from the treated one having 70 palms was maintained as untreated control.

*Present work:* The experiment was continued and observations on fresh beetle attack were recorded once a month.

*Result:* The data collected so far indicate that the incidence of pest attack varied from month to month and that it was lower in the treated block than in the control (Table V).

TABLE V.

Incidence of the beetle attack in the insecticide treated as well as control block.

Period of observation	Percentage of beetle attack	
	Treated	Control
July, 1957	2.19	4.25
August	2.90	7.14
September	1.70	5.70
October	1.20	1.40
November	0.24	5.70
December	3.05	10.0
January, 1958	0.5	7.14
February	2.14	5.70
March	10.84	17.00
April	6.61	7.14
May	7.93	15.71
June	5.82	12.86

Providing trap pits and spraying the breeding places with BHC have proved beneficial in checking beetle attack.

#### B. *Biological Control.*

*Object:* To investigate the beneficial role of parasites and predators in controlling the pest population.

##### (a) *Studies on indigenous parasites and predators.*

Search for the parasites and predators was continued. The common predatory insects observed were *Oxycetonia versicolor* and an Elaterid beetle. Both the insects were found feeding on the eggs of *O. rhinoceros*.

##### (b) *Studies on the imported parasites and predators.*

###### (i) *Parasite.*

Two shipments of *Scolia oryctophaga* Coq. were received in August and September 1957 from Mauritius, consisting of 154 females and 152 males of which only



138 females and 86 males were in good condition. The adult wasps remained alive under laboratory conditions up to 45 days. During the period 541 eggs were laid. The incubation period of the egg was 2-4 days. The parasitic larvae fed on the body contents of *Oryctes* grubs and pupated within 7-9 days. The pupae were collected and kept in special containers away from light at 10°C. for the emergence of the adult. Emergence of the adult was not observed in any of the pupae even after 9 months. Examination of some of the pupae after dissection revealed that most of them were alive but no development was taking place.

TABLE VI.

Shows the details of the imported parasite.

No. of parasites des-patched		No. of parasites recd. in good condition		No. of eggs laid	Incubation period of eggs	No. of eggs hatched	Larval period	No. of pupae
Male	Female	Male	Female					
Male	Female	Male	Female					
152	154	86	138	541	2-3 days	360	7-9 days	265

A total of 33 adults (30 females and 3 males were liberated in the field in October, 1957. These wasps were not traceable later.

(ii) *Predator.*

Twenty eggs of the bug *Platymeres rhadamanthus* Gerst were received from Mauritius in March, 1957. On breeding the bug population has been built up to form the third generation consisting of 23 adults, 148 nymphs and 72 eggs. The adult bug and its different nymphal stages were observed feeding on a variety of insects besides the rhinoceros beetle.

II. *Investigations on the Coconut Caterpillar (Nephantis serinopa* Meyr).

1. *General survey.*

*Object:* To study the intensity of *Nephantis* infestation and its seasonal variation.

*Previous work:* A survey of the pest showed that it was prevalent throughout the coastal and littoral tracts of Kerala and in a very severe form in localised areas.

*Present work:* On continuing the survey the pest attack was observed to be serious in certain localities along the coastal and backwater areas in Kerala. The pest also caused severe damage to coconuts growing in elevated places in the interior of the State.

## 2. *Biology.*

*Object:* To devise effective control measures.

*Previous work:* The duration of the different instars was studied in detail.

*Present work:* Some of the biological aspects of the pest were under observation. A study of the alternate host of the pest revealed that it can feed normally on ornamental palms such as *Chrysalidocarpus lutescens* and *Calamus* sp. as on coconut leaves.

## 3. *Study of the population of the pest and its parasites in relation to ecological conditions.*

*Studies on the population of the parasites of N. serinopa.*

*Object:* To study the pupal and larval parasites in the field.

*Previous work:* Random collections of the pupae from the field were made and were under observation in the laboratory for the emergence of the parasites. Monthly record of the field parasitisation of the pupae was maintained.

*Present work:* Further data on the field parasitisation of the pupae were collected and are presented in Table VII.

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TABLE VII.

Record of field parasitisation of *N. serinopa* percentage occurrence of pupal parasites.

Period of observation	Chalcids		Eulophids		Ichneumonids	
	Stomatoceros sulcatiscutellum	Brachymeria nephandidis	Trichospilus pupipora	Xanthopimpla punctata	Goryphus nursei	
July 1957	6.66	11.11	—	—	—	
August	20.0	22.5	2.5	2.5	—	
September	30.0	20.0	—	—	—	
October	11.50	19.23	—	—	—	
November	—	29.5	1.28	—	—	
December	3.92	19.61	—	—	—	
January 1958	18.52	—	—	—	—	
February	3.62	3.62	—	—	—	
March	5.42	8.13	—	—	—	
April	4.0	5.7	0.28	—	—	
May	2.06	13.1	1.03	0.35	0.35	
June	8.79	5.56	—	0.88	0.28	

A record of the larval parasites was also made. The most common larval parasites were the Bethylid (*Perisierola nephandidis*), the Elasmid (*Elasmus nephandidis*) and the Vipionid (*Apanteles taragamae*). Besides, a few predatory beetles were also observed.

This item of work forms a scheme under the II Five-Year Plan and will be dealt with in Part II of this report.

#### 4. Insecticidal control.

*Object:* To determine the most effective insecticidal treatment for the control of the pest.

##### (a) Laboratory trials.

*Previous work:* A number of preliminary tests were conducted with Dieldrin, Diazinon, Endrin and Folidol. All the insecticides tested were lethal to *N. serinopa* at 0.2 per cent strength.

*Present work:* (i) Trials with lower strengths of the above mentioned insecticides are in progress.

(ii) Different strengths of Malathion were also tested against *Nephantis* larvae. Early stages of the fifth instar larvae were liberated on fresh coconut leaflets and were allowed to establish there. After two days the leaflets were sprayed with 0.05, 0.075 and 0.1 per cent of Malathion prepared from a 25 per cent wettable formulation. Controls were also maintained with leaflets sprayed with water. Observations were recorded after 24 hours for a period of one week.

Malathion at all the strengths tested caused more than 80 per cent mortality 7 days after treatment (Table VIII).

TABLE VIII.

Showing the effect of Malathion on *Nephantis* larvae.

Treatments % of Malathion	Effect after 7 days – Percentage of larvae		
	Normal.	Paralysed.	Dead.
0.05	17.29	Nil	82.71
0.075	13.78	Nil	86.22
0.1	13.05	Nil	86.95
Control	100	Nil	Nil

##### 5. *Biological control.*

*Object:* To investigate the possibility of controlling the pest by its natural enemies, parasites and predators.

*Previous work:* Studies on the biology of the common parasites and parasite breeding under laboratory conditions were conducted.

*Present work:* On continuing the studies on the biology of the parasites their longevity under different conditions of temperature and relative humidity and when fed on different food materials was investigated. Observations were also recorded on the feeding and stinging habits of the parasites on their host.



During the period under report more than five lakhs of Eulophids, nearly 1100 Elasmids, 26,000 Bethylids and 2,300 microbracon were bred in the laboratory and were supplied to coconut growers and to various Parasite Breeding Stations.

The reduviid bug, *Platymeres rhadamanthus* was observed feeding voraciously on the larvae of *Nephantis* under laboratory conditions.

### III. The Palm weevil (*Rhynchophorus ferrugineus* F)

#### 1. General Survey.

*Object:* To study the distribution of the pest.

*Previous work:* The survey conducted earlier showed that the pest occurred in a serious form in certain places in Kerala.

*Present work:* The survey was continued; an increase in the incidence of pest attack was observed. Severe attack by the palm weevil was also reported from Mysore and Madras States. In Kerala the incidence of weevil attack was more serious in places where the leaf rot was prevalent. The rotted portions of the leaves were observed to attract the weevils for egg laying.

#### 2. Biology and Bionomics.

*Object:* To study the life-cycle of the pest in detail in order to devise effective control measures.

*Previous work:* The duration of the different stages, viz., the egg, the larvae and the pupae of the weevil was studied and recorded.

*Present work:* Studies on the life history of the pest were continued. Copulated females along with the feeding materials laid eggs within 2 or 3 days after emergence from the cocoon. The females survived for a longer period than the males without food. Morphological studies of the adult are also in progress.

#### 3. Symptomatology.

*Object:* To study the symptoms manifested by palms attacked by weevil so that infestation could be detected in the very early stages.

*Previous work:* Wilting of leaves and splitting of the petioles of the wilted leaves were the symptoms observed on a freshly infested palm. In the advanced stages of weevil attack, holes on the stem which are the entry points of the weevil grub, extruding of chewed up and discarded fibres from these holes and also exuding of a reddish-brown fluid were the typical symptoms.

*Present work:* Studies on symptomatology were continued. It was observed that the weevil can enter the tree through all parts of the crown, the stem and in rare instances through the bole region. Entry of the weevil from the apex of the crown causes wilting of the inner leaves and is considered to be the most dangerous since the grubs get easy access to the cabbage of the palm.

#### 4. *Insecticidal control.*

*Object:* To find out effective insecticidal treatments for the control of the palm weevil.

##### a) *Laboratory trials.*

*Previous work:* Trials with various insecticides viz., Aldrin, Dieldrin, Endrin, Basudin, Folidol and Pedixbade emulsion, Malathion and various formulations of Pyrocon-E were conducted.

*Present work:* The studies on the effect of different concentrations of Pyrocon - E - 110 and Malathion against grubs and adults of the weevil were continued.

##### b) *Field trials.*

*Previous work:* Injections with various strengths of Endrin, Pyrocon-E 1/10 and 2/20, Malathion and Heptachlor were conducted on pest infested palms.

Prophylactic treatment of leaf axil filling with BHC or Chlordane mixed with sand was carried out.

*Present work:* Experiments are in progress with 2 per cent Pyrethrum extract. The experimental palms are kept under observation.

Filling of the leaf axils with BHC or Chlordane mixed with equal quantity of sand at the rate of 1 lb. (453.59 gms.) of the mixture per tree was continued.



The application of the insecticidal mixture was done every three months. So far all the treated palms remain free from weevil attack.

5. *Research for parasites and predators.*

The reduviid bug *Platymeres rhadamanthus* feeds well on the larvae and adults of the weevil under laboratory conditions. An ear wig was also observed feeding on the eggs of the weevil. Some mammalian predators like mongoose and squirrels were also observed.

IV. **The Cockchafer beetle** (*Leucopholis coneophora* Burm)

1. *General survey.*

*Object:* To study the distribution and spread of the pest.

*Previous work:* A survey of the pest in Kerala revealed its presence in Thiruvalla, Mavelikkara and in South Malabar.

*Present work:* On continuation of the survey the pest was observed at Shasthamkotta in Quilon District. In general the incidence of the pest was not severe during the period under report.

2. *Biology and ecology.*

*Object:* To study the life history of the pest and the correlation of the environmental factors with the distribution of the pest.

*Previous work:* Studies on the life history of the pest, morphology and its feeding habits were conducted. Duration of the different stages of the beetle was the last instar of the grub, 20 to 30 days, prepupal period 9 to 12 days, pupal period 28 to 33 days and the adult 18 to 36 days. The adult beetle did not cause any damage to coconut roots or the intercultivated crops but the larvae were found to feed voraciously on coconut roots.

*Present work:* Earlier studies were continued. Ecological studies indicated that the grub population in the soil is related to the moisture content of the soil. Excess of soil moisture during the early half of the year and dearth of the same in the latter half were not

favourable for the grubs. Similarly high temperature was unsuitable for the larvae, e. g., at 94°F no larvae were observed even at 2' depth of soil. pH of the soil in the infested gardens was recorded and it was found to vary from 5.4 to 6.4

### 3. *Insecticidal trials.*

*Object:* To find out an effective and economic treatment for the control of the pest.

*Previous work:* Field trials were conducted with different insecticides like BHC, Chlordane, etc., at Thazhakkara (Mavelikkara). BHC and Chlordane at the rate of 56 lb. (25.4 kg.) and 28 lb. (12.7 kg.) per acre (0.4 hectare) respectively gave better control of the pest than Aldrin and Heptachlor.

*Present work:* A revised experiment was started in May, 1957. The treatments are as follows:

- i) BHC 5% dust at the rate of 56, 112 and 224 lb. (25.4, 50.8 and 101.6 kg.) per acre (0.4 hectare).
- ii) BHC 55% wettable at the rate of 5.5, 11.0 and 22.0 lb. (2.49, 4.99 and 9.98 kg.) per acre (0.4 hectare).
- iii) Chlordane 5% dust at the rate of 28, 56 and 112 lb. (12.7 25.4 and 50.8 kg.) per acre (0.4 hectare).
- iv) Heptachlor 3% dust at the rate of 16-2/3, 33-1/3 and 66-2/3 lb. (7.56, 15.1 and 30.2 kg.) per acre (0.4 hectare).
- v) Heptachlor 5% dust at the rate of 20, 40 and 60 lb. (9.07, 18.14 and 27.22 kg.) per acre (0.4 hectare).
- vi) Control, untreated (4 plots).
- vii) Control, sprayed with water (1 plot).

The layout is simple randomized block design each treatment being replicated three times in plots of 75' x 20' (22.86 x 6.09 m). The insecticides were applied once a year. Observations on the population of the pest were recorded every month. The results indicate that BHC and Chlordane 5% dust treatments gave better results in controlling the pest than BHC 50% wettable, Aldrin and Heptachlor (Table IX).

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TABLE IX

Showing the grub population in the different insecticidal treatments (average of 12 observations)

Insecticidal treatments.	BHC 5% dust.			BHC 50% wettable.			Chlordane 5% dust.			Aldrin 3% dust.			Heptachlor 5% dust.		
	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
Treated	Nil	Nil	1	1	1	Nil	Nil	Nil	Nil	3	Nil	2	1	5	3
Control		4			6			6			4			4	

#### 4. Search for parasites and predators.

So far no parasites have been recorded on the beetle. Birds like crows and owls and mammals like jackals, squirrels, bats, etc., were observed feeding on the adults of the beetle.

#### V. Investigations on minor pests.

**Object:** To study the intensity of the pest incidence, biology and control measures of the various pests which are of minor importance.

**Previous Work:** Studies on the methods of control of termites, Coccids and rats were in progress.

**Present work:** In addition to the previous work studies on the biology of the pests, *Parasa lepida*, *Gangara thyrasis* and *Suastus gremius* were carried out. Investigations on the pests of copra were also in progress.

#### Plant Pathology.

Plant Pathology Section of this institution deals with the coconut palm diseases in general and the leaf-rot and root (wilt) disease in particular. Both these diseases are very acute in Kerala, occurring in all types of soils in the coastal area as well as the interior of the State. Investigations carried out on these two diseases comprise studies on the causative organism (s), the effect of environmental conditions on the incidence of disease and control measures and the virological nature of the root (wilt) disease.

## VI. Leaf disease — Leaf-rot.

Earlier observations have shown that the fungi *Helminthosporium halodes*, *Gloeosporium* sp. and *Gliocladium roseum* are intimately associated with the leaf rot of coconut. Diseased leaves collected from different places were examined and the fungal colonisers were isolated during the year under report. The leaf samples yielded *H. halodes*, *Gloeosporium*, *G. roseum*, *Pestalotia palmarum*, *Fusarium* sp. and *Curvularia* sp. Frequent examination of healthy leaves was also carried out to check up the occurrence of the fungi associated with the disease. Observations recorded so far reveal the presence of *H. halodes* only in leaves showing symptoms of leaf rot.

Leaf-rot affected leaves of arecanut palms received from the Arecanut Nursery, Quilon, were also examined. The diseased leaves were found to harbour *Helminthosporium*, *Curvularia*, *Fusarium* and *Thielaviopsis*.

### 1. Infection trials.

**Object:** To study the pathogenic capability of the three fungi:— *H. halodes*, *Gloeosporium* sp. and *G. roseum* on healthy seedlings.

#### a) Field trials.

**Object:** Earlier experiments have indicated the pathogenicity of the three fungi mentioned above, on tender leaves of coconut. The present trials are being carried out under field conditions during the different months of the year to determine when the leaves require maximum protection from the fungi. The experiment was started in March 1958 as suggested by the Expert Reviewing Committee (1957).

**Treatments.** (1) Inoculated with *H. halodes*.  
(2) " " *G. roseum*.  
(3) " " *Gloeosporium* sp.  
(4) Uninoculated control.

**Replicates.** (10) three year old seedlings.

The youngest shoots of the seedlings were inoculated once a month by spraying suspensions of fungal mycelia grown in Potato-dextrose solution for one week. The



control plants were sprayed with an equal quantity of sterile distilled water.

*Result:* Observations were made from the third day after inoculation and the fungal infection was recorded as mild (+), moderate (++) and severe (+++). The data collected so far are presented in Table X. The infected leaves were examined in the laboratory and the inoculated organisms were reisolated. The shoots of control seedlings remained healthy.

TABLE X.

Pathogenicity of *H. halodes*, *Gloeosporium* and *G. roseum* towards coconut.

	No. of experi- mental seedlings.	No. of shoots inocu- lated.	Period of inoculation	Intensity of infection.
<i>H. halodes</i>	10	10	March 1958	6 (++); 2 (+); 2 nil
		8	April "	3 (+++); 4 (++); 1 nil
		4	May "	2 (++); 2 (+)
		4	June "	4 (+++)
<i>G. roseum</i>	10	7	March "	5 (+); 2 nil
		10	April "	8 (++); 2 (+)
		4	May "	4 (++)
		4	June "	4 (++)
<i>Gloeosporium</i>	10	9	March "	2 (++); 7 nil
		9	April "	8 (++); 1 (+)
		2	June "	2 (++)

(b) *Incidence of infection in relation to nutrient deficiencies.*

*Object:* To study the incidence of *H. halodes* infection on healthy coconut seedlings grown under different nutrient supply in sand culture.

*Previous work:* A sand culture experiment was conducted where seedlings were grown in different combinations and levels of NPK and Ca. The nutrient com-

binations were NP, NK, PK and NPK with and without calcium, the concentration of the nutrients supplied being 1/40th and 1/80th of the field dose for adult palms (N 0.5 lb;  $P_2O_5$  0.5 lb. and  $K_2O$  0.75 lb), once a week. The seedlings were inoculated with *H. halodes* once a month with a suspension of macerated fungal mycelia. Fungal infection in the form of lesions were observed on the tender leaves of all the seedlings irrespective of the treatments.

*Present work:* The experiment was continued during the period under report. Observation recorded on fungal infection was similar to that of the previous year.

The experiment was discontinued in December, 1957. It will be repeated along the lines suggested by the Expert Reviewing Committee in 1957.

2. *Nutritional effect of urea applied as foliar spray.*

*Object:* To study the effect of urea when applied as foliar spray on the diseased condition of the palm.

*Previous work:* Six diseased trees were sprayed with 1 per cent solution of urea at the rate of 1.75 litres per tree at quarterly intervals, i. e. in June, October, December and March. A similar number of diseased palms were sprayed with distilled water and served as controls.

*Present work:* The previous experiment was continued.

*Results:* Observations on the foliar condition of the palms and their yield data were recorded. No conclusions could be drawn from the data so far collected.

3. *Effect of manuring with and without fungicidal spray.*

This experiment is dealt with under item VIII, 2.

4. *Comparative efficacy of fungicides.*

*Object:* To study the efficacy of different fungicides in controlling leaf rot both under laboratory and field conditions. The fungicides tested were Kirthi copper, Shell copper, Bordeaux mixture, Fytolan, Cuprosana and Perelan.

(a) *Laboratory trials.*

(i) *Screening trials.*

*Previous work:* The effect of various fungicides in checking the infection of *H. holodes*, *Gloeosporium* sp.



and *G. roseum* on tender leaflets was tested. The test material was first given a spray with the fungicide and later inoculated with the fungus. The material was incubated in moist chamber and observations were recorded every 24 hours.

*Present work:* Similar trials as in previous years were conducted with Kirthi copper, Shell copper, Bordeaux mixture and Fytolan. The concentration of the fungicides used were 1 per cent for Bordeaux mixture and 0.25 per cent for the others.

*Result:* None of the leaflets which were treated with the fungicides showed symptoms of infection, whereas all the leaflets in the control series (untreated) presented the characteristic symptoms, namely, spotting and subsequent rotting.

(ii) *Lethal dose of fungicides on fungal cultures.*

To study the lethal dose of fungicides on fungi causing leaf-rot, viz. *H. halodes*, *Gloeosporium* sp. and *G. roseum*, preliminary experiments to study the effect of the fungicides at different concentrations on the growth of the fungi in culture was started.

Fungicides tested – Kirthi copper, Fytolan, Shell copper and Cupravit.

Concentration of – 0.15, 0.2, 0.25, 0.3 and 0.4 per cent.

Culture media – Potato – dextrose agar and malt agar.

The agar media containing the different concentrations of the fungicides were poured in Petri-dishes, about 15 cc. per dish, and the dishes were inoculated with cork borer discs of the fungi cut out from 3 days old colonies. Each treatment was replicated 4 times. Radial spread of the fungi was recorded every 24 hours for 5 days.

*Result:* Kirthi copper in potato-dextrose agar at all the concentrations tried inhibited the growth of all the three fungi, however, complete inhibition was not observed even at the highest concentration tried, viz., 0.25 per cent. In malt agar 0.2 per cent of Kirthi copper was lethal to *H. halodes*.



Fytolan and Shell copper at 0.4 and 0.3 per cent in malt agar failed to inhibit the growth of *H. halodes* completely whereas Cupravit was lethal at 0.3 per cent.

Shell copper and cupravit were lethal to *G. roseum* even at 0.15 per cent concentration.

The experiment is in progress.

b) *Field trials.*

i) *Comparative effect of the fungicides in controlling leaf-rot.*

*Previous work:* Diseased trees were treated with Bordeaux mixture, shell copper, Kirthi copper, Perelan and Cuprosana at quarterly intervals, six trees per treatment. The concentration of the fungicides was 1 per cent for Bordeaux mixture and 0.25 per cent for the others.

*Present work:* The previous experiment was continued. The fungicidal treatments included Fytolan (0.25 per cent strength) besides the others.

*Result:* Observations recorded so far on the foliar condition of the palms indicate improvement in the condition of the treated palms and the fungicides may be mentioned in their order of efficacy as Bordeaux mixture, Perelan, Cuprosana, Shell copper and Kirthi copper. Since the trial with Fytolan was started only during the latter half of the year under report no conclusions could yet be drawn regarding its effect on leaf-rot.

ii) *Effect of Bordeaux mixture in controlling leaf-rot.*

*Previous work:* To study the effect of different strengths and frequency of applications of Bordeaux mixture on leaf-rot an experiment has been in progress. Bordeaux mixture at 0.5 per cent and 1.0 per cent strength was sprayed at bimonthly and quarterly intervals on diseased trees, six trees per treatment.

*Present work:* The experiment was continued. Besides a set of 20 diseased trees were sprayed with 1 per cent Bordeaux mixture at quarterly intervals.

*Result:* The experiment has been in progress since 1956. The data collected so far indicate that increase in



the frequency of application is more beneficial than increase in the strength of the fungicidal spray. Thus the palms which received bimonthly spraying recorded about 12 per cent reduction in disease incidence (based on the number of healthy leaves produced), whereas those treated at quarterly intervals showed only 9 to 8 per cent improvement. As compared to this the control palms recorded 13 per cent increase in the incidence of disease. Experimental trees are kept under observation.

5. *Varietal resistance of coconut to Helminthosporium infection.*

*Object:* To study the resistance of different varieties of coconut to infection by *H. halodes*.

*Previous work:* Infection trials were conducted in the field using two-year old seedlings of the varieties Philippines, Kappadam, Cochin-China, Laccadive dwarf, Laccadive micro, F. M. S. big and New Guinea. The tendermost shoots of the seedlings were inoculated by inserting cotton wool soaked in the mycelial suspension of *H. halodes* between the leaflets. The inoculated leaves were protected by wrapping them with paper and coconut leaves. Observations were recorded from the third day after inoculation.

*Present work:* The experiment was continued.

*Result:* So far all the seedlings, two for each variety have been inoculated twice. In all cases successful infection was observed although the severity of infection varied with atmospheric conditions.

## VII. Root (wilt) disease.

Several samples of roots from diseased and healthy palms were examined periodically. On culturing the roots from diseased palms yielded *Botryodiplodia theobromae*, *Rhizoctonia bataticola*, *R. solani*, *Fusaria* and a few saprophytic fungi. From the roots of healthy palms all the above-mentioned fungi were isolated excepting *R. solani*. *R. bataticola* also was not so common as in the case of diseased roots.

1. *Infection experiments with fungi associated with the root disease.*

**Object:** To study the pathogenic nature of the fungi *Botryodiplodia theobromae*, *Rhizoctonia solani* and *R. Bataticola*.

**Previous work:** Injection trials were conducted with the three fungi on potted seedlings, and on seedlings in the field. In the case of potted seedlings the inoculum (fungi grown individually on sterilized paddy and coconut roots) was supplied through the bottom of the container so as to come in immediate contact with the roots. In the case of seedlings growing in the field individual roots were inoculated by inserting the roots into test-tubes containing the fungal cultures.

**Present work:** Inoculation trials were continued (a) on individual roots of seedlings in the field and (b) with potted seedlings.

**Results:** (a) on individual roots - Within a week after inoculation all the inoculated roots showed symptoms of rotting at the tip. The intensity of rotting was more in the case of roots inoculated with *R. solani*. However, the characteristic symptoms of the disease were not visible in the crown.

(b) So far none of the inoculated seedlings have exhibited the symptoms of disease.

## 2. *Fungal infection in relation to water-logged / acidic condition.*

**Object:** To study whether the infection of *R. solani* is related to the water-logged / acidic condition of the growing medium.

**Previous work:** A pot culture experiment was conducted with seedlings grown in sand (a) with water logging and (b) no water-logging. pH in both the series was adjusted to 4.5. Half the number of seedlings in each series was inoculated with *R. solani* at weekly intervals.

**Present work:** The pot culture experiment was continued till November 1957. A fresh trial will be conducted along the lines suggested by the Expert Reviewing Committee.

## 3. *Studies on the rhizosphere microflora.*

This item forms a scheme under the Second Five-Year Plan and is reported in Part II of this report.



4. *Investigations on the occurrence of R. solani in roots in relation to the condition of the palms and roots.*

*Object:* The study the role of *R. solani* in disease incidence.

*Previous work:* Earlier observations show that the occurrence of *R. solani* in coconut roots is related to a certain extent to the condition of the roots and the palm. *R. solani* invariably occurs only in diseased roots and rarely in healthy roots of diseased palms.

*Present work:* For confirmation of the earlier data roots (healthy as well as rotted) of healthy and diseased palms were systematically examined and the fungal colonisers were isolated.

*Result:* Observations recorded were similar to those in previous year, viz., the occurrence of *R. solani* is related to the diseased condition of the palm and roots.

5. *Studies on the micro organisms occurring in root sap.*

*Object:* To study the nature of micro organisms occurring in the root sap of palms both healthy and diseased.

*Previous work:* Root sap collected from roots of healthy and diseased palms were examined and the micro organisms present in it were isolated by the dilution plate method. No distinct variation between the sap from healthy and diseased palms was evident.

*Present work:* A detailed study on the micro organisms occurring in the root sap was taken up. Root sap from 14 diseased and 2 healthy palms was collected periodically and the micro organisms were assessed by the dilution plate method. Dilutions of the root sap ranging from  $1 \times 10^5$  to  $1 \times 10^8$  and different culture media, viz., Potato dextrose agar, Sodium albuminate agar and Thornton's agar were used for the purpose. The plates were incubated at room temperature and observations were recorded from the 3rd day.

*Results:* Large numbers of bacterial colonies occurred in the root sap of both diseased and healthy palms. Considerable variation in the bacterial population of the

sap was observed between the roots of different trees and between the roots of the same palm. The micro organisms isolated from the root sap were mostly saprophytic forms. Further studies are in progress.

#### VIII. General.

##### 1. *Behaviour of palms from nuts selected from healthy and diseased palms.*

*Object:* To study how far the incidence of disease in the progeny is related to the condition of the parent (healthy or diseased).

*Previous work:* The condition of the seedlings raised from healthy, diseased and hybrid parents were recorded.

*Present work:* Similar observations as in previous year were recorded.

*Result:* Of the 80 seedlings raised for these studies, in 10 disease symptoms have developed. The present condition of the seedlings indicates that the percentage of healthy seedlings is higher among those raised from healthy and hybrid parents.

##### 2. *Manuring-cum-spraying trials.*

*Object:* To study the effect of manuring with and without spraying and higher doses of manures coupled with spraying on the diseased condition of the palms.

*Previous work:* A manurial-cum-spraying experiment conducted in Block I of the Station indicated the beneficial effect of the treatments in controlling the disease. Hence it was proposed to study the effect of:

(a) manuring with and without spraying under different types of soil, and

(b) intensive manuring coupled with spraying, on the disease.

##### a) *Effect of manuring with and without spraying under different types of soil.*

The experiment was continued in the same gardens selected earlier, to represent sandy soil (Krishnapuram), sandy loam soil (Mavelikkara and Vyttila) and reclaimed soil (Monkompu in the Kuttanad area). The treatments were:



- i) NPK lime fungicidal spray.
- ii) NPK lime, and
- iii) untreated control.

Besides the manures applied as ammonium sulphate (3 lb.), Muriate of potash (3 lb.) and bone meal (2 lb.) per palm, a green manure crop grown *in situ* was ploughed in at the time of flowering. Palms under treatment (i) were sprayed with 1 per cent Bordeaux mixture three times a year.

*Results:* Observations recorded on the foliar condition of the palms indicate improvement in the case of palms under treatment (i) this effect being more perceptible in sandy and sandy loam soil. Similarly, an increase in the yield data of the palms under treatment (i) in sandy and sandy loam soil was observed. The experiment is being continued.

b) *Intensive manuring-cum-spraying trial.*

This is a continuation of the experiment in Block I of the Station. The layout is on the model of the manurial experiments conducted at the Regional Research Stations. The manurial treatments were:

- |      |   |   |      |   |   |      |   |   |     |
|------|---|---|------|---|---|------|---|---|-----|
| i)   | N | - | 1.5; | P | - | 1.5; | K | - | 3.0 |
| ii)  | N | - | 1.5; | P | - | 1.5; | K | - | 4.5 |
| iii) | N | - | 3.0; | P | - | 1.5; | K | - | 4.5 |
| iv)  | N | - | 3.0; | P | - | 3.0; | K | - | 4.5 |
| v)   | N | - | 3.0; | P | - | 3.0; | K | - | 6.0 |

- vi) Control (no manuring and no spraying).

The manures were applied in split doses with an interval of about one month between the applications. Nitrogen was applied half as groundnut cake and half as ammonium sulphate,  $P_2O_5$  as bone meal and  $K_2O$  as muriate of potash.

A green manure crop (sunn hemp) grown *in situ* was applied at the rate of about 110 lb. per tree in ring trenches taken at the base of the trees and lime at the rate of  $\frac{1}{2}$  ton per acre was also supplied to the experimental palms.

All the palms excepting those under treatment (vi) received four sprayings with 1 per cent Bordeaux mixture and one spraying with 1 per cent urea per year.

Each treatment consisted of 30 palms in two plots each of about 30 cents.

*Observations:* The foliar condition and the yield data of the palms were recorded prior to the treatments.

### 3. *Summer irrigation.*

*Object:* To study the effect of summer irrigation on the condition of the palms, diseased and healthy.

*Previous work:* 12 palms, 9 diseased and 3 healthy were under this experiment. Shallow basins, 2 metres in diameter, dug around the trees were thickly mulched with coconut leaves and the palms were watered with about 25 gallons of water twice a week. Six palms, 3 healthy and 3 diseased, served as controls.

*Present work:* The experiment was continued and observations on the foliar condition of the palms were recorded.

## IX *Investigations in Virus Pathology.*

The virological aspect of the root (wilt) disease of coconut is dealt with under this item. These investigations include a survey of the insect population in coconut gardens, disease transmission trials, histopathogenic and host range studies. Virus investigations form a scheme under the Second Five-Year Plan and hence the work done from March 1958, when the scheme started functioning, will be reported under Part II of this report.

### I. *Survey of the insect population in coconut gardens.*

*Object:* To study the various insects visiting the coconut palms to determine their probable nature as vectors in transmitting the root (wilt) disease.

*Previous work:* Collection of nocturnal insects from healthy and diseased palms was started.

*Present work:* Representative samples of diurnal and nocturnal insects were collected by means of fly-paper at weekly intervals from 6 healthy and 6 diseased palms.



Of the diurnal insect visitors *Stephanitis typicus* formed the major collection followed by ants and spiders. *S. typicus* was found in larger numbers on diseased than on healthy palms and in the diurnal collection than in the nocturnal.

The nocturnal insect visitors had a broader representation than the diurnal with may flies, ants and beetles forming the major groups.

## 2. Disease transmission trial under controlled conditions

**Object:** To see how far the disease can be transmitted by (a) insect vectors, and (b) inoculation of the sap from leaves of diseased trees.

**Previous work:** Disease transmission trials were conducted under field conditions both by using insect vectors as well as by inoculation of the sap from leaves of diseased palms. Majority of the treated palms manifested disease symptoms in about 10 to 13 months while most of the control palms remained healthy. However, for conclusive evidence of the disease transmission by the vector and sap inoculation the experiments were proposed to be repeated under controlled conditions.

**Present work:** It was not possible to conduct disease transmission trials under controlled conditions as the insect-proof house is only under construction. Nevertheless the experiments were repeated under field conditions.

### (a) Insect transmission trials.

Disease transmission trials were conducted on palms of different ages using *Stephanitis typicus* as the vector. The insects collected from healthy seedlings were fed for 24 hours on the leaves of diseased palms and then transferred on to the youngest open leaf of healthy palms. These inoculations were repeated at monthly intervals for one year.

Experimental results are presented in Table XI. As recorded earlier the first symptom of disease was manifested 10 to 13 months after the first inoculation. About 60 per cent of the inoculated palms were infected whereas only 16 per cent of the controls developed disease symptoms.

TABLE XI

Insect transmission trials with *S. typicus*

Expt. No.	Treatment.	Age of plants.	No. of plants.	
			Inoculated.	Infected.
1	Inoculated	6 to 10 years.	9	4
	Control	"	9	nil
2	Inoculated	40 to 50 years.	6	5
	Control	"	6	1
3	Inoculated	25 to 45 years.	6	3
	Control	"	6	1

b) *Sap inoculation trials.*

Fourty-two healthy palms were inoculated by the abrasion method using sap collected from leaves of diseased palms. The middle leaflets of the youngest open leaf were inoculated once a month. During the period under report 64 per cent of the inoculated trees belonging to the age group 6 to 10 years were infected while all the palms maintained as control remained healthy.

TABLE XII.

Expt. No.	Treatment	Age of plants.	No. of plants.	
			Inoculated	Infected
I	Test plants	6 to 10 years	11	7
"	Control	"	11	0
II	Test plants	40 to 50 years	11	3
"	Control	"	6	0
III	Test plants	1 to 2 years	20	1
"	Control	"	20	0



### 3. *Histological studies.*

*Object:* The presence of bi-nucleate cells in the different parts of the coconut palms affected by "Lethal yellowing" was reported by Nutman and Roberts from Jamaica and was attributed to a virus infection. The present work was taken up to find out whether any parallel phenomenon exists in palms affected by root (wilt) disease. These studies are also expected to reveal any internal structural changes that may accompany the various external symptoms of disease.

As a preliminary work, a number of samples collected from the different parts of healthy and diseased palms from the Station garden were fixed in Formalin - aceto alcohol and Chrom - acetic fluids and serial sections of these samples were prepared. Heidenhains hematoxylin, iron hematoxylin - safranin and safranin - fast green were the stains tried. A few bi and multi nucleate cells were found in the ground tissue of tender leaves of infected trees. Samples from healthy palms were collected from a disease free-area, namely, Kasaragod for purposes of comparison.

### 4. *Host range studies.*

*Object:* To find out the host range of the suspected virus of the root (wilt) disease and also to find out a suitable indicator plant for pathogenicity trials.

*Previous work:* Various palms, viz., *Areca lutescense*, *Cocos plumosa* an oil palm, and other plants like banana, *Jatropha*, etc., grown in the station garden were used for disease transmission trials. Vegetable crops like snake gourd, cucumber, cowpea, ladies finger, chilli, tomato, etc., were also used as test plants. Disease symptoms, namely, yellowing, flaccidity and leaf curl were observed in a number of plants.

*Present work:* Disease transmission trials were continued under controlled conditions. Test plants were raised in sterilized soil inside insect-proof cages and insect transmission and sap inoculation trials were conducted on them. French bean, tomato, cucumber and chilli were used for these trials. As in previous experiments disease symptoms like yellowing and leaf curl were

observed in the case of inoculated plants. Control plants maintained in separate insect-proof cages remained healthy.

### **Plant Physiology.**

The Plant Physiology Section of this Station deals with investigations on the nutrition and physiology of the palm with special reference to the root (wilt) and leaf diseases. The important items of investigation include studies on the nutrient uptake of the palms, the effect of nutrients (macro and micro) on the disease, deficiency symptoms in coconut seedlings, transpiration studies and anatomical studies of the roots and leaves.

### **X. Plant physiological investigations.**

#### **1. *Studies on the disease symptoms and rate of deterioration on the palm due to disease.***

**Object:** To study the symptomatology of the root (wilt) disease and the behaviour of the palms after contracting the disease.

**Previous work:** Observations were recorded on the susceptible age of the palms, the visual symptoms of disease and the progressive change in the condition of 24 diseased palms.

**Present work:** The studies were extended to a few more palms and the symptoms of the diseases were recorded in detail.

**Observations:** Disease symptoms manifested by the leaves are: (a) discolouration, yellowing or bronzing which may start as small dots or streaks, (b) flaccidity of the very young leaves or a few old leaves or sometimes both young and old leaves, (c) twisting and snapping of leaf tips, (d) reduction in the size of leaves, and (e) puckering of leaflets.

The inflorescences of diseased palms in several instances fail to open or its opening may be retarded. Premature drying up of the entire spadix was also observed in certain palms. A higher number of sterile or dummy pollen and a low germination percentage of pollen was recorded in diseased palms as compared to the healthy. Shedding of immature nuts is yet another symptom of the disease.



Typical symptoms observed in the roots are the abrupt cessation of the growth of roots, rotting of the root tips, increased branching due to the death of the growing apex and the presence of cracks and necrotic patches on the hypodermis of older roots. The number of functioning roots as determined by the exudation of sap was fewer in diseased palms than in healthy.

On continuing the studies on the deterioration in the condition of the diseased palms the earlier observations were confirmed, viz., the disease symptoms aggravate rapidly and the bearing palms stop flowering in about 2 or 3 years in certain cases, whereas in some others the deterioration is slow and the condition of the palms remains unchanged for over 6 years. In a very few instances recovery lasting for even three years was observed.

## 2. *Micro-nutrient manurial experiment.*

*Object:* To study the effect of application of certain micro-nutrients (B, Cu, Fe, Mn, Zn and Mo) including Mg as a preventive as well as a control measure for the root and leaf diseases.

### *Experimental details.*

*Layout:* 2<sup>7</sup> confounded design.

*No. of plots:* 16 with 24 palms in each.

*No. of replication:* 3 palms per treatment.

*Treatments:* Micronutrients applied individually as well as in combination (vide appendix). The form of micronutrient and the quantity applied per tree per year are as follows:

<i>Nutrient</i>	<i>Quantity</i>	<i>Form</i>
Magnesium	0.100 lb.	Magnesium sulphate.
Boron	0.057 „	Sodium borate,
Copper	0.128 „	Copper sulphate.
Manganese	0.123 „	Manganese sulphate.
Iron	0.100 „	Ferrous sulphate.
Molybdenum	1.0 gm.	Ammonium molybdate.
Zinc	0.113 lb.	Zinc Sulphate.

*Basal application of manures:* All the experimental palms were supplied with 0.75 lb. N as groundnut cake, 0.75 lb.  $P_2O_5$  as bone meal and 1.5 lb. as  $K_2O$  as potassium sulphate per tree per year. Besides, a green manure crop, sunnhemp, grown *in situ* was ploughed in at the time of flowering and lime at the rate of 2 cwt. per acre was broadcast in the experimental plots.

*Previous work:* Experimental palms were given five annual application of the micronutrients. Morphological observations on the production and shedding of leaves, number and size of the typical leaflets, number of female flowers produced and number of nuts developed etc., were recorded. Yield data of the palms was also collected.

*Present work:* The experiment was continued. Detailed morphological observations and the yield data of the experimental palms were recorded as in previous years. Chlorophyll and dry matter content of representative samples of leaves from healthy and diseased palms were assessed.

*Result:* Based on the present foliar condition of the palms as compared to their pretreatment condition the percentage of trees which have improved, deteriorated and remaining unchanged have been worked out (Table XIII). The overall yield of the experimental palms has increased from 29.1 nuts to 39.6 nuts per tree during the experimental period of five years.

From the data collected so far, improvement in the condition of palms cannot be attributed to any particular treatment; nor is there any correlation between the improvement in the foliar condition of the palms and their yield data.

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TABLE XIII.

Original condition of trees.	Improved.	Percentage of trees which have remained unchanged.		deteriorated.
Healthy	35.1	36.0		28.9
Diseased early stage	31.6	43.8		24.6
„ advanced stage	21.8	40.9		37.3

The Expert Reviewing Committee (1957) suggested that the micro-nutrients may be administered as solution through cut ends of roots instead of their application in soil. Preliminary investigations on the administration of micro-nutrients by the root injection method were carried out. The micro-nutrients in four different doses, viz., 1/40th, 1/60th, 1/80th and 1/120th of the soil application dose were given to 24 trees (both diseased and healthy). Details of the dosage of micronutrients are as given in Table XIV.

TABLE XIV

Level	MgSO <sub>4</sub> 7H <sub>2</sub> O	Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub> 10H <sub>2</sub> O	CuSO <sub>4</sub> 5H <sub>2</sub> O	MnSO <sub>4</sub> H <sub>2</sub> O	FeSO <sub>4</sub> H <sub>2</sub> O	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub> 6H <sub>2</sub> O	ZnSO <sub>4</sub> 7H <sub>2</sub> O	Total amount of salt/ ppm.	No. of trees.
I 1/40th soil application	2.8743 gm.	1.4025 gm.	1.3744 gm.	1.0734 gm.	0.9548 gm.	0.0115 gm.	1.4107 gm.	9.1019 gm. 18200 ppm.	6
II 1/60th soil application	1.9158 gm.	0.930 gm.	0.9161 gm.	0.7161 gm.	0.6365 gm.	0.00775 gm.	0.9409 gm.	6.06315 gm. 12130 ppm.	6
III 1/80th soil application	1.4372 gm.	0.7012 gm.	0.6222 gm.	0.5368 gm.	0.4774 gm.	0.00575 gm.	0.7054 gm.	4.48595 gm. 8970 ppm.	6
IV 1/120th soil application	0.9579 gm.	0.465 gm.	0.458 gm.	0.3580 gm.	0.3182 gm.	0.003875 gm.	0.4704 gm.	3.03137 gm. 6060 ppm.	6



The application of micronutrients as foliar spray was discontinued as per the suggestion of the Expert Reviewing Committee.

### 3. *Root injection trials.*

*Object:* To study response of the diseased trees to the administration of nutrients (micro and macro), hormones, chemotherapeutants, antibiotics chelates, sequestrene compounds, etc.

*Previous work:* Root injections of chemotherapeutant 1182 F, urea, copper sulphate, sequestrene compounds and hormones were carried out on selected trees and seedlings. Palms treated with 1182 F urea exhibited favourable response while certain doses of copper sulphate and the hormone MCPB had toxic effect. Details of the treatments are given in Table XV.

#### *Present work:*

#### (a) *Micronutrients in the organic form.*

Quarterly injection of a combination of Mg Fe Cu was given to four trees. This experiment was discontinued later since similar treatments will be given under micro-nutrient manurial experiment.

#### (b) *Sequestrene compounds.*

Iron, copper, sodium and calcium in organic form as 330 Fe,  $\text{Na}_2\text{Cu}$ , NaFe and  $\text{Na}_2\text{Ca}$  were administered to four trees at the rate of 2.5 gm. per tree at monthly intervals. Reduction of yellowing of leaves was noticed in palms treated with  $\text{Na}_2\text{Cu}$ , NaFe and 330 Fe. (Table XV).

#### (c) *Hormones.*

Effect of root injection of B-Naphthoxy acetic acid (NAXA), Phenyl acetic acid (PA), 2-4 Dichlorophenoxy acetic acid (2-4 D), 2 methyl, 4-Chlorophenoxy acetic acid (MCPA) and 4-Chloro-2 methyl phenoxy butyric acid (MCPB) on diseased palms was studied. Drying of the peripheral layer of the stem was noticed in the case of palms injected with MCPB. Hence the application of this hormone was discontinued.

#### (d) *Nitrogen as urea.*

Monthly injection of urea was continued on 15

diseased trees. Reduction in the yellowing of leaves was noticed as detailed in the table XV.

(e) *Copper sulphate.*

Half yearly injection of heavy doses of copper sulphate was continued on the diseased palms. Severe toxic symptoms were noticed in palms treated with 10 g., 12.5 g. and 15 g of  $\text{CuSO}_4$  and hence these treatments were discontinued. Two lower doses of  $\text{CuSO}_4$  viz., 2.5 g and 5 g were however included under this trial.

(f) *Chemotherapeutant 1182 F.*

1182 F, a proprietary product of the Grag Agricultural Chemicals, U. S. A., containing the active ingredients 4-Chloro-3, 5 — Dimethyl phenoxy ethanol was injected into 40 trees and 15 seedlings at the rate of 2 cc stock solution in 400 cc of water. The foliar condition of some of the treated palms has improved, the condition of a few others remains unchanged while in four seedlings recurrence of the disease symptoms was noticed.

TABLE XV

Particulars of the root injection experiments.

Treatments	Date of starting of the experiment	No. of trees treated	Tress remaining unchanged	No. of trees improved	No. of trees deteriorated
<b>1182 F</b>					
4-Chloro-3, 5-dimethyl	Dec. 1953	4	Nil	4	Nil
phenoxy	May 1955	5	4	1	Nil
ethanol	June 1956	31	Nil	10	Nil
	June 1956	15	5	8	2

**Hormones.**

B Naphthoxy  
acetic acid  
(NaXA)

Sept. 1955      4      3      1      Nil



Phenyl acetic acid (PA)	Sept. 1955	4	2	2	Nil
2-4, Dichloro-phenoxy acetic acid (2-4D)	" "	8	7	1	"
2-Methyl 4-Chloro phenoxy acetic acid (MCPA)	" "	4	4	Nil	"
4-chloro-2-methyl phenoxy butyric acid (MCPB)	" 1956	4	Nil	Nil	4

*Sequestrene compounds.*

330 Fe	Jan. 1957	4	2	2	Nil
Na Fe	" "	4	1	2	Nil
Na <sub>2</sub> Cu	" "	4	2	2	"
Na <sub>2</sub> Ca	" "	4	4	Nil	"
Cu So <sub>4</sub>	Feb. 1957	8	2	Nil	6
	April 1958	10	7	3	Nil
Urea	Feb. 1955	5	3	2	Nil
	June 1956	10	7	3	Nil

4. *Anatomical studies.*

*Object:* To study the anatomical variations if any, between the different parts of the healthy and diseased palms and a periodical check up of the conducting tissues of the diseased palms.

*Previous work:* Serial sections of roots along the growing region, the cortical zone with the epidermis and the hypodermal zone of old roots were prepared and critically examined.

*Present work:* Epidermal patterns of the healthy and diseased trees were studied. It was found that the epidermal cells including stomata were more on leaves of root (wilt) diseased palms as compared to that of healthy tree per unit area. Further studies with leaf and flower samples from healthy and diseased palms are in progress.

## 5. *Study of deficiency symptoms in coconut seedlings.*

*Object:* To study the general foliar symptoms on coconut seedlings due to deficiencies of macronutrients (N, P and K) under pot culture conditions.

*Previous work:* A pot culture experiment was conducted with one year old seedlings, the nutrients being supplied in the form of solution once a week. The nutrient treatments were NPK, NK, NP, PK, N, P, K and control. The nutrients were supplied at 1/40th of the field dose (Field dose N – O. 75 lb.;  $P_2O_5$  – O. 75 lb. and  $K_2O$  1.5 lb.). Enough calcium to make the nutrient solution neutral and an arbitrary dose of micronutrients B, Cu, Fe, Mn, Mo and Zn was also supplied. Observations on the foliar condition of the seedlings were recorded,

*Present work:* The experiment was continued and the scheduled doses of nutrients were supplied to the seedlings regularly.

*Result:* The foliar symptoms of the seedlings showed a general chlorosis in all the seedlings which received "K" alone and in all treatments having no 'N'. Diminution in the growth of the seedlings was also noticed in the absence of 'N'. Maximum growth was recorded by the seedlings supplied with NPK. Among the treatments, NP and NK better growth was observed in seedlings which received NP.

As suggested by the Expert Reviewing Committee this experiment will be modified and repeated. This item is included in a scheme under the Second Five-Year Plan.

## 6. *Studies on root exudation.*

*Object:* To study, (a) the quantitative and qualitative variation in the sap exuded by roots of healthy and diseased palms and the different types of roots in a single palm, (b) whether the administration of the crude sap will produce disease symptoms in healthy palms and (c) whether wilt occurs first or the change in pH of the sap to alkalinity.



*Previous work:* Investigations were conducted on the quality and quantity of the sap exuded by roots of healthy and diseased palms. pH of the sap from diseased roots was invariably alkaline.

Sap exuded by diseased roots of diseased palms was injected at bimonthly intervals into four healthy palms for one year. 18 months after the first injection one tree showed symptoms of disease while the others remained healthy. The trial was repeated on four more trees.

*Present work:* On continuation of the previous experiment 8 more palms were included under the trial. One set of palms was given a mixture of the sap from healthy and diseased palms and another set received sap from healthy palms alone. All the palms are kept under observation.

A systematic study on the pH of the sap collected from roots of healthy and diseased palms is in progress to ascertain the correlation between the alkalinity of the root sap and the diseased condition of the palm.

#### 7. *Inducing aerial roots for feeding diseased trees.*

*Object:* To study the possibility of inducing aerial roots and their utility as channels of food to ameliorate the diseased condition of the palms.

*Previous work:* 12 diseased trees were induced to grow aerial roots by the "box method". The following nutrients were applied as solution to the rooting medium in the box.

#### *Nutrient treatments.*

- (i) NPK
- (ii) NPK    Mg    Cu    Fe
- (iii) NPK    Mg    Cu    Fe    B    Mn    Mo    Zn

N, P and K were supplied at 1/10th of the field dose and the dosage of the micronutrients were as follows:

MgSO <sub>4</sub>	7H <sub>2</sub> O	3.04 g.	per tree per month.
FeSO <sub>4</sub>	7H <sub>2</sub> O	1.0	" "
MnSO <sub>4</sub>	4H <sub>2</sub> O	0.666	" "
CuSO <sub>4</sub>	5H <sub>2</sub> O	0.366	" "
ZnSO <sub>4</sub>	7H <sub>2</sub> O	0.366	" "
(NH <sub>4</sub> ) <sub>6</sub>	Mo <sub>7</sub> O <sub>24</sub> 4H <sub>2</sub> O	0.061	" "
Na <sub>2</sub> B <sub>4</sub> O <sub>7</sub>	10H <sub>2</sub> O	1.45	" "

*Present work:* The experimental palms were given the scheduled treatments. Observations on the foliar condition of the palms were recorded.

8. *NPK exhaust by coconut.*

*Object:* To estimate the quantity of macronutrients N, P, K, Ca and Mg exhausted during one year by the coconut palm under diseased and healthy conditions.

*Previous work:* The method of sampling the plant material was worked out and a few samples were analysed for their nutrient content.

*Present work:* More samples of healthy palm tissues were analysed for N, P, K, Ca and Mg.

This item of work was included in a scheme under the Second Five-Year Plan.

9. *Studies on the translocation and accumulation of food in coconut.*

This item of work was not done during the year under report. It has been included in a scheme under the Second Five-Year Plan.

10. *Transpiration studies.*

*Object:* To determine the quantity of water transpired by a healthy palm during the different seasons under conditions prevalent at the Research Station and to study the variation in the transpirational efficiency of healthy and diseased palms.

*Previous work:* Preliminary trials were made to standardise a method to study transpiration in coconut. Studies on transpiration in relation to age of leaf, humidity, sunlight, etc., were initiated.

*Present work:* Previous work was continued and the studies were extended to a few more healthy and diseased palms.

11. *Studies on coconut root system.*

*Object:* To have a clear knowledge on the root system of the coconut palm both in health and disease.

*Previous Work:* A detailed study of the root system of the coconut based on the following points was carried out:

a) The formation, development and longevity of the bole,



- b) The development, length and longevity of the first root,
- c) Vertical penetration, lateral spread, colour, growth rate, absorbing power and longevity of the main roots.
- d) Frequency, thickness, etc., of rootlets and
- e) Conditions favourable for the formation of aerial roots and for inducing the production of aerial roots,

*Present Work:* (a) Examination of the root system (1/8th sector) of a palm replanted after inducing aerial roots three years ago revealed that the bole had grown by about 0.5 m. in length and the tree had produced approximately 3500 roots.

(b) As suggested by the Expert Reviewing Committee a periodical examination of the root system of both healthy and diseased palms has been started to determine whether the deranged root metabolism is a cause or effect of wilt disease or whether root degeneration and wilt are unconnected phenomena.

(c) Studies on the bole of seedlings of various ages have been started. A special nursery was raised to study the root development in coconut seedlings.

## 12. *Miscellaneous.*

### (a) *Disease transmission through Pollen.*

*Object:* To find out whether the root (wilt) disease could be transmitted to progenies through the male parent (pollen).

*Previous Work:* Observations were recorded on the condition of the seedlings raised from:

- (i) Healthy Female x diseased Male
- (ii) Healthy Female x healthy Male
- (iii) Healthy Female x unknown Male (natural cross) grown under natural conditions.

*Present work:* The experiment was discontinued as suggested by the Expert Reviewing Committee.

### b) *Special manurial treatment.*

*Object:* To improve the condition of diseased trees a special manurial treatment was suggested by Shri Pappu Paravara.

*Previous work:* The special treatment was given to 30 diseased trees, the annual dose of nutrients supplied

being, groundnut cake 5 lb. Ash 50 lb. cowdung 100 to 120 lb. common salt 10 lb. and lime 5 lb. per tree. Cow gram raised *in situ* round the trees was also applied to the palms in ring trenches.

*Present work:* The treatments were continued and the palms are kept under observation.

### Soil Chemistry.

Investigations on the nutrition of the palm, the soil and other environmental conditions with particular reference to the leaf and root (wilt) diseases are being conducted in the Soil Chemistry section of this institution. These investigations include study of soils of healthy and diseased coconut areas, studies on soil moisture, manurial experiments and examination of healthy and diseased palm tissues for micro and macronutrients.

#### XI. Chemical investigations.

1. a) *Study of soils of healthy and diseased coconut areas of Travancore-Cochin in relation to the chemical composition of leaves.*

*Object:* To study the correlation between physico-chemical properties of soil and chemical composition of leaves.

*Previous work:* A rapid reconnaissance survey of healthy and diseased coconut areas of Travancore-Cochin was conducted and 169 soil samples from 64 profile pits representing the sandy, red loam, alluvial loam, laterite and reclaimed clayey soils and 64 leaf samples from trees growing near the profile pits were collected.

*Present work:* Forty-seven soil samples from the above group were analysed for nitrogen, total and available phosphoric acid, total and available potash, lime, magnesia, iron alumina and pH. Of these, 12 samples were also examined for exchangeable bases and total exchange capacity.

The total exchange capacity ranged from 2 m. e. to 4 m.e./100 gm. soil and calcium formed nearly 40 per cent of the exchangeable bases followed in order by magnesium and potassium. Sodium is found only in traces in the exchange complex. The data of analysis are presented in Tables XVI and XVII.



TABLE XVI.

Showing the results of analysis of soil samples from healthy and diseased coconut areas of Travancore-Cochin.

Lab. No.	Locality	Healthy or diseased area	depth	Total Nitrogen %	Hcl Soluble $P_2O_5$ %	Hcl Soluble $K_2O_5$ %	Lime Cao %	Magnesia Mgo %	Available $P_2O_5$ %
1	2	3	4	5	6	7	8	9	10
1	Ethambulai	Healthy	0'-1'	0.104	0.02	0.03	0.02	0.02	0.01
2	Nagercoil	"	1'-1'	0.021	0.02	0.04	0.01	0.01	0.003
3	"	"	2'-3'	0.025	0.02	0.05	0.02	0.02	0.002
5	Collachel	"							
6	Nagercoil	"	0'-1'	0.029	0.03	0.04	0.01	0.01	0.000
7	"	"	1'-2'	0.025	—	0.03	0.02	0.02	0.007
9	"	"	2'-3'	0.024	0.04	0.06	0.02	0.01	0.006
	R. C. Station								
	Pachallur	"	0'-1'	0.05	0.02	0.05	0.06	0.01	0.0006
10	"	"	1'-2'	0.05	0.02	0.08	0.05	0.01	0.0003
11	"	"	2'-3'	—	0.02	0.09	0.03	0.09	0.0003
12	"	"	3'-4'	0.05	0.03	0.09	0.03	0.08	Trace
13	"	"	4'-5'	0.05	0.03	0.10	0.03	0.004	Trace
14	"	"	5'-6'	0.05	0.03	0.09	0.03	0.005	Trace
24	Vamanapuram	Diseased	0'-1'	0.081	0.082	0.089	0.011	0.097	0.0040
25	"	"	1'-2'	0.067	0.06	0.094	0.011	0.081	0.0035

26	Vamanapuram	Diseased	2'-3'	0.081	0.068	0.114	0.017	0.063	0.004
28	"	Healthy	0'-31"	0.06	0.067	0.101	0.034	0.063	0.004
29	"	"	21'-33"	0.092	0.088	0.148	0.022	0.089	0.0025
31	Porunthamon								
	pulimathu	Diseased	0-12"	0.091	0.025	0.168	0.034	0.064	Trace
32	"	"	12-18"	0.059	0.017	0.165	0.022	Trace	Trace
33	"	"	18"-36"	0.077	0.015	0.088	0.045	Trace	Trace
35	"	Healthy	0-12"	0.095	0.038	0.129	0.034	Trace	Trace
36	"	"	12"-24"	0.05	0.019	0.086	0.022	Trace	Trace
37	"	"	Below 24"	0.063	0.019	0.070	0.0560	Trace	Trace
39	Chirayinkil	"	0-9"	0.059	0.055	0.123	0.022	0.064	0.0036
40	"	"	9"-23"	0.106	0.069	0.161	0.056	0.064	0.0030
41	"	"	23"-26"	0.038	0.036	0.161	0.056	0.080	0.0037
42	"	"	26"-42"	0.057	0.047	0.111	0.034	0.032	0.0035
44	Karunagapally	Diseased	0-12"	0.028	0.062	0.067	0.022	0.064	0.025
45	"	"	12-24"	0.024	0.053	0.302	0.022	0.048	0.021
48	"	Healthy	0-12"	0.03	0.036	0.050	0.017	0.016	0.021
49	"	"	12-24"	0.03	0.031	0.037	0.028	0.032	0.024
50	"	"	24"-36"	0.022	0.025	0.045	0.022	0.040	0.020
52	Chavara	"	Beach sand						
				0.006	0.017	0.023	0.039	0.113	0.011
53	"	Diseased	0-1'	0.03	0.029	0.060	0.034	0.040	0.0082
54	"	"	1'-2'	0.03	0.017	0.055	0.017	0.024	0.0059
55	"	"	2'-3'	0.022	0.031	0.060	0.011	0.032	0.0077
57	"	Healthy	0-1'	0.02	0.036	0.040	0.011	0.088	0.0054



1	2	3	4	5	6	7	8	9	10
58	"	"	1'-2'	0.02	0.023	0.047	0.028	0.064	0.0029
59	"	"	2'-3'	0.02	0.024	0.051	0.034	0.072	0.0038
61	Kottarakara	Diseased	0-15"	0.04	0.059	0.050	0.034	0.064	0.0053
62	"	"	15"-36"	0.03	0.051	0.082	0.039	0.080	0.0051
64	"	Healthy	0-15"	0.04	0.029	0.074	0.056	Trace	0.0030
65	"	"	15"-36"	0.04	0.024	0.081	0.045	Trace	0.0010
67	Punalur	Diseased	0-1'9"	0.07	0.082	0.142	0.056	Trace	0.0030
68	"	"	1'9"-3'0	0.07	0.093	0.149	0.146	Trace	0.0010
70	"	Healthy	0-1'6"	0.07	0.090	0.423	0.067	Trace	0.0050
71	"	"	1'6"-3'0	0.07	0.070	0.252	0.078	0.112	0.0020

TABLE XVI

Showing the results of analysis of soil samples from healthy and diseased coconut areas of Travancore-Cochin (Continued)

Lab. No.	Locality	Available K <sub>2</sub> O %	pH	Loss on ignition	Moisture %
1	Ethambulai	0.01	6.5	0.69	0.29
2	Nagercoil	0.004	6.5	0.91	0.35
3	"	0.004	6.5	1.41	0.51
5	Collachel	0.003	6.5	1.48	0.51
6	Nagercoil	0.003	6.5	1.65	0.61
7	"	0.004	6.5	1.84	0.67
9	R. C. Station	0.006	5.4	—	—
10	Pachallur	0.007	6.1	—	—
11	"	0.006	5.6	—	—
12	"	0.004	5.5	—	—
13	"	0.015	5.4	—	—
14	"	0.009	5.4	—	—
24	Vamanapuram	0.0103	5.6	5.77	1.69



1	2	11	12	13	14
25	"	0.0047	5.4	5.32	1.8
26	"	0.0284	5.3	6.48	2.08
28	"	0.0123	5.6	5.54	1.85
29	"	0.0373	5.7	8.24	2.53
31	Porunthamon pulimathu	0.0184	5.2	9.91	0.5
32	"	0.0095	5.8	9.03	0.59
33	"	0.0063	5.6	4.79	0.69
35	"	0.0114	5.2	7.85	1.01
36	"	0.0042	5.4	4.97	0.71
37	"	0.0067	5.0	4.88	0.74
39	Chiranyinkil	0.0063	5.0	3.78	1.2
40	"	0.0104	5.8	8.64	0.90
41	"	0.0046	5.8	2.17	0.82
42	"	0.0105	5.4	4.78	0.5
44	Karunagapally	0.0046	5.3	1.19	0.56
45	"	0.0030	5.8	1.09	0.48
48	"	0.0049	5.6	0.98	0.4
49	"	0.0047	5.4	0.63	0.5
50	"	0.0045	5.4	0.57	0.6
52	Chavara	0.0138	6.5	0.63	0.51
53	"	0.0042	5.3	0.89	0.4
54	"	0.0044	5.5	0.84	0.4

55	"	0.0048	5.5	0.84	0.4
57	"	0.0045	5.6	0.80	0.5
58	"	0.0040	5.8	0.80	0.5
59	"	0.0028	5.6	0.90	0.6
61	Kottarakara	0.0052	6.0	1.60	0.6
62	"	0.0047	5.9	2.0	1.0
64	"	0.0070	5.3	1.60	0.9
65	"	0.014	6.0	1.30	1.34
67	Punalur	0.006	6.0	4.0	2.52
68	"	0.007	5.4	5.8	4.44
70	"	—	5.2	4.2	2.64
71	"	0.063	5.7	5.1	3.48



**TABLE XVII**

Studies on soils of healthy and diseased areas of  
Travancore-Cochin. (Base exchange capacity  
and exchangeable bases)

Lab. No.	Locality Diseased or healthy.	Profile pit depth.	Total exchange capacity m. e/100 gms.	Exchange- able cal- cium (Ca) m. e/100 gms.	Exchange- able pot- assium (K) m. e/100 gms.	Exchange- able sod- ium (Na) m. e/100 gms.	Exchange- able magne- sium (Mg) m. e/100 gms.
1/56	Healthy	Prof.	2.0	1.2	0.34	Traces	0.25
	Etham- bulai	0-1'					
2/56	"	1'-2'	2.2	0.8	Traces	"	0.25
3/56	"	2'-3'	2.7	1.1	0.12	"	0.25
5/56	Collachel						
	healthy	0-1'	3.7	1.1	0.34	"	0.38
6/56	"	1'-2'	—	1.4	0.34	"	—
7/56	"	2'-3'	2.9	1.3	0.28	"	0.38
9/56	R.C.R.S.						
	Pachalur- Healthy	0-1'	3.4	1.6	0.12	"	0.25
10/56	"	1'-2'	3.4	1.4	Traces	"	0.38
11/56	"	2'-3'	4.0	0.8	"	"	0.50
12/56	"	3'-4'	3.9	0.8	"	"	0.25
13/56	Pettai, Trivandrum						
	Diseased	0-1'	3.5	0.7	0.22	"	0.25
14/56	"	1'-2'	3.9	0.8	0.44	"	0.25

(b) *Soil survey of the Research Station garden.*

**Object:** To prepare a soil map of the Research Station with a view to have the initial values of fertility status.

**Previous work:** 438 soil samples were collected from 1st, 2nd and 3rd foot layers of each plot of the Station garden. Samples from alternate plots were analysed for nitrogen, phosphoric acid, potash, lime, magnesia, available and pH. Analysis of 14 samples remained to be completed.

**Present work:** The analysis of the samples was completed. The data are presented in Table XVIII.

TABLE XVIII.

Showing the results of analysis of soil survey samples from  
Central Coconut Research Station garden.

No.	Block No.	Depth	Total N%	HCl Soluble P <sub>2</sub> O <sub>5</sub> %	HCl Soluble K <sub>2</sub> O%	Lime CaO%	Magnesia MgO%	Available P <sub>2</sub> O <sub>5</sub> %	Available K <sub>2</sub> O%	pH
415	VII	0-1'	0.02	0.02	0.08	0.02	0.02	0.007	Trace	6.4
416	"	1'-2'	0.02	0.02	0.06	0.02	0.02	0.004	0.004	6.3
417	"	2'-3'	0.02	0.01	0.01	0.02	0.02	0.003	0.004	6.2
421	"	0-1'	0.02	0.02	0.01	0.03	0.03	0.006	0.007	6.8
422	"	1'-2'	0.02	0.02	0.02	0.02	0.02	0.007	Trace	6.7
423	"	2'-3'	0.02	0.01	0.02	0.02	0.02	0.005	0.008	6.8
424	VIII	0-1'	0.03	0.019	0.065	0.08	0.05	0.01	0.007	6.6
425	"	1'-2'	0.04	0.007	0.045	0.05	0.05	0.004	0.006	6.5
426	"	2'-3'	0.03	Trace	0.055	0.05	0.05	Trace	0.014	5.5
430	"	0-1'	0.03	0.005	0.033	0.03	0.03	0.004	0.008	5.0
431	I	1'-2'	0.02	0.008	0.021	0.03	0.04	0.002	Trace	6.0
432	"	2'-3'	0.02	0.009	0.026	0.02	0.05	0.003	Trace	5.6
436	"	0-1'	0.03	0.02	0.052	0.03	0.03	0.005	Trace	6.0
437	"	1'-2'	0.02	0.01	0.051	0.02	0.03	0.002	Trace	6.0
438	"	2'-3'	0.02	0.01	0.02	0.01	0.02	0.003	Trace	5.9



The study showed that the nutrient status of the entire garden is low and that there is no appreciable difference in fertility status of different blocks.

A detailed soil survey of the garden was also conducted during the year. The morphological features of the soil were examined and soils mapped. The normal soil is loamy sand to sandy loam in texture, structureless, non-cohesive, loose in consistency and well drained. Profiles appreciably different from the normal in consistency and colour were noticed in Blocks I and V. The profile characters of the soils are presented in Tables XIX, XX and XXI.

TABLE XIX.

Detailed Soil survey of Central Coconut Research Station garden Kayangulam. Characteristics of Profile Pit I. (Block III) Normal soil.

Horizon	A	B <sub>1</sub>	B <sub>2</sub>
Depth	0-20"	20"-73"	73"-120"
Thickness	20"	53"	47"
Boundary	Clear	gradual	clear
Colour	Dark grey	Yellowish brown	White sand
Moisture	Moist	Moist	More moist
Colour of mottling	Nil	Nil	Yellow
Structure	Structureless	Structureless	Structureless
Texture	Loamy sand	Loamy sand	Loamy sand
Consistance	Loose	Loose	Loose
Concretion	Nil	Nil	Nil
Root distribution	Roots of weeds, upto 6". Below 6" coconut roots	Coconut roots throughout (abundant)	Coconut roots few
Reaction	—	—	—
Carbonate	Nil	Nil	Nil
Special feature	—	—	—
Permeability	Moderately rapid	Moderately rapid	(Moderate) Water table reached below 120"

TABLE XX.

Detailed soil survey of Central Coconut Research Station garden, Kayangulam.  
Characteristics of profile Pit II (Block V)

Horizon	A			B		
	A <sub>0</sub>	A <sub>1</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	
Depth	0-6"	6"-39"	39"-52"	52"-68"	68"-86"	
Thickness	6"	33"	13"	16"	18"	
Boundaary	Gradual	Clear	Clear	gradual	Clear	
Colour	Grey	Grey white	dark brown	Yellowish brown	Grey white	
Moisture	Moist	Moist	Less moist	Less moist	more moist	
Colour of mottling	Nil	Nil	brown in abundance	Yellow	—	
Structure	Structureless	Structureless	Blocky	Structureless	Structureless	
Texture	Sandy	Sandy	Sandy	Sandy	Sandy	
Constitance	Loose	Loose	Firm	Loose	Loose	
Concretion	Nil	Nil	Concretion of iron	Concretion of iron	Nil	
Root distribution	Roots of weeds	Roots of weeds and coconut	Few roots	Few	very few	
Reaction	—	—	—	—	—	
Carbonate	Nil	Nil	Nil	Nil	Nil	
Special features	—	—	—	—	—	
Permeability	Rapid	Rapid	Slow	Moderate	Moderately rapid	
Remarks	Water table below 86"					



**TABLE XXI.**

Detailed Soil Survey of Central Coconut Research Station garden, Kayangulam. Characteristics of Profile Pit III. (Block I).

Horizon Sub-Division	A			B	
	A <sub>0</sub>	A <sub>1</sub>	B <sub>0</sub>	B <sub>1</sub>	B <sub>2</sub>
Depth	0-4"	4"-18"	18"-65"	65"-89"	89"-98"
Thickness	4"	14"	47"	24"	9"
Boundary	Clear	Clear	Clear	Clear	Clear
Colour	Grey	Bright red	Red	Pale yellow	White
Moisture	Moist	Moist	Moist	Moist	Very moist
Colour of mottling	Nil	Nil	Nil	Nil	Yellow
Structure	Structureless	Structureless	Structureless	Structureless	Structureless
Texture	Sandy	Sandy	Sandy	Sandy	Sandy
Consistence	Loose	Loose	Loose	Loose	Loose
Concretion	Nil	Nil	Nil	Nil	Nil
Root distribution	Roots of weeds	Few	Few	Nil	Nil
Reaction	—	—	—	—	—
Carbonate	Nil	Nil	Nil	Nil	Nil
Special feature	Nil	Nil	Nil	Nil	Nil
Permeability	Mod-erately rapid	Mod-erately rapid	Mod-erately rapid	Mod-erately rapid	Mod-erately rapid
Remarks	Water table below 98"				

2. *Studies on soil moisture:* Effect of the cover crop *Pueraria phaseoloides* on soil moisture and temperature in sandy soil.

*Object:* To gather data on the moisture content and temperature of soil with and without a cover crop and its effect on moisture conservation of soil during summer months.

*Previous work:* The data of soil temperature at the surface and at 5, 15 and 30 cm. below the surface were recorded daily and the moisture determined in 1st, 2nd and 3rd foot samples during summer months in the control and cover crop plots.

*Present work:* Further data collected on soil temperature and moisture confirm the previous finding that a cover crop of *P. phaseoloides* has the beneficial effect of considerably lowering the surface temperature of soil in summer, thus conserving the soil moisture for plant growth. The data for temperature are presented in Table XXII and that for moisture and pH in Table XXIII.

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TABLE XXII.

Effect of cover crop on soil temperature.

Month		Control Plot			Cover Crop Plot				
		5 cm. Depth	15 cm. Depth	30 cm. Depth	Surface	5 cm. Depth	15 cm. Depth	30 cm. Depth	Surface
July	1957	46.8°C	36.7°C	30.8°C	48.0°C	38.2°C	32.3°C	28.5°C	43.0°C
August	"	48.7°C	38.1°C	32.3°C	52.0°C	38.5°C	31.7°C	28.9°C	46.0°C
September	"	51.9°C	37.8°C	33.7°C	53.0°C	35.5°C	30.6°C	29.5°C	46.0°C
October	"	53.6°C	39.2°C	34.4°C	53.9°C	37.5°C	31.2°C	30.0°C	45.0°C
November	"	43.6°C	37.1°C	32.1°C	50.0°C	31.8°C	28.1°C	27.4°C	35.0°C
December	"	43.7°C	36.3°C	32.7°C	50.3°C	32.0°C	28.0°C	27.2°C	42.2°C
January	1958	48.0°C	35.1°C	31.8°C	53.9°C	34.1°C	29.2°C	28.4°C	46.2°C
February	"	49.2°C	37.4°C	32.6°C	56.2°C	35.8°C	31.2°C	30.2°C	47.4°C
March	"	51.5°C	38.1°C	33.9°C	57.3°C	37.8°C	31.9°C	31.2°C	49.2°C
April	"	50.6°C	38.9°C	35.0°C	58.2°C	35.8°C	33.1°C	32.2°C	42.7°C
May	"	44.6°C	37.4°C	32.6°C	50.2°C	29.4°C	28.0°C	28.4°C	39.4°C

TABLE XXIII.

Effect of cover crop on soil moisture and pH.

Month	Depth of soil		Control Plot		Cover Crop Plot	
	Moisture %		pH		Moisture %	pH
September 1957	0-30"	3.5	6.7		5.0	6.5
	30-60"	5.0	6.6		5.0	6.4
	60-90"	6.2	6.7		4.7	6.4
November 1957	0-30"	3.0	7.2		4.2	7.2
	30-60"	4.6	7.0		4.5	7.0
	60-90"	6.0	7.2		5.2	7.2
December 1957	0-30"	2.8	—		3.6	—
	30-60"	2.0	—		2.9	—
	60-90"	2.1	—		2.6	—
February 1958	0-30"	1.1	—		2.0	—
	30-60"	3.4	—		2.6	—
	60-90"	5.3	—		3.2	—

3. *Studies on waterlogged soils for accumulation of soluble salts and the effect of salinity on disease.*

*Object:* To study the salt concentration and its possible effect in causing the diseases of coconut in waterlogged areas.

*Previous work:* Soil samples collected during the soil survey were examined for water soluble salts and conductivity.

*Present work:* More samples were examined as in previous year. The data collected so far revealed that there is no accumulation of salts to any considerable extent. The total solids content ranged from 0.002 to 0.133 per cent and the specific conductivity from 27.5 to 1900 Micromhos.

4. *Manurial experiments.*

*Object:* To study the possibility of curing the diseases of coconut by the application of manures.

(a) *Effect of application of lime and ash.*

*Previous work:* Lime at 8 lb. and ash at 60 lb. (in two doses) per tree over a basal dressing of groundnut



cake (7 lb.), bone meal (3 lb.), and muriate of potash (2 lb.) per tree per year were applied to 25 diseased palms. Another 25 trees were maintained as untreated controls. Observations were recorded on the condition of the trees every year prior to the manurial application. Leaf and soil samples drawn before manuring were analysed for lime and potash.

*Present work:* Manurial treatment was continued. 36 leaf samples were analysed during the period and the data are presented in Table XXIV.

TABLE XXIV

Analysis of leaf samples from lime-ash experimental trees.

Tree No.	Block and treatment.	Plot No.	Total Nitrogen N%	HCl Soluble P <sub>2</sub> O <sub>5</sub> %	HCl Soluble lime Cao%	HCl soluble K <sub>2</sub> O%	MgO%	Ash%	Insoluble (Silica) %
1.	2	3	4	5	6	7	8	9	10
67	1	1	1.27	0.26	0.51	1.30	0.13	5.3	1.5
159		„	1.46	0.39	0.43	1.90	0.04	6.5	2.0
164	Control	„	1.63	0.45	0.43	2.65	0.22	6.5	1.3
174		„	1.24	0.42	0.46	2.90	0.18	7.2	1.3
175		„	1.46	0.46	0.49	2.99	0.26	8.1	1.6
77		2	1.42	0.49	0.56	1.71	0.13	7.6	2.6
108		„	1.46	0.41	0.51	1.85	0.27	6.5	1.8
114	L + A	„	1.49	0.42	0.52	1.90	0.18	7.2	2.9
116	(Lime +	„	1.65	0.48	0.68	1.96	1.18	9.0	4.7
125	Ash)	„	1.37	0.39	0.44	2.20	0.18	6.2	1.6
101		3	1.58	0.43	0.58	1.78	0.13	6.0	1.6
119		„	1.43	0.41	0.64	1.69	0.08	5.6	2.9
138	Control	„	1.37	0.47	0.64	—	0.09	7.0	1.0
139		„	1.16	0.39	0.45	2.40	0.13	6.1	1.5
145		„	1.32	0.31	0.59	2.50	0.09	6.4	—
151		4	1.43	0.39	0.64	2.10	0.09	6.2	1.9
154		„	1.23	0.43	0.63	2.50	0.18	6.4	1.3
165	L + A	„	1.41	0.47	0.50	1.90	0.09	6.5	2.6

171	..	1.62	0.39	0.63	2.20	0.22	6.4	1.3
177	..	1.27	0.39	0.67	2.30	0.13	6.9	2.6
39	VIII 5	1.27	0.39	0.61	1.79	0.04	8.6	2.0
45	..	1.42	0.44	0.48	2.08	0.18	6.5	2.1
47	Control ..	1.38	0.37	0.61	1.79	0.18	5.5	2.1
57	..	1.26	0.38	0.67	2.20	0.13	5.9	1.9
64	..	1.16	0.52	0.36	2.98	0.29	6.6	1.1
120	6	1.17	0.39	0.35	2.68	0.28	5.7	1.9
122	..	1.18	0.34	0.55	2.30	0.28	6.2	1.8
132	L + A ..	1.30	0.45	0.69	1.39	0.25	6.6	2.5
169	..	1.50	0.49	0.40	2.20	0.36	6.8	1.9
170	..	1.28	0.36	0.39	2.08	0.19	6.4	2.4
60	7	1.19	0.52	0.46	3.04	0.26	6.2	1.4
61	..	1.27	0.52	0.31	2.52	0.22	6.3	1.3
82	Control ..	1.28	0.49	0.53	2.56	0.38	6.1	1.4
107	..	1.58	0.49	0.64	2.02	0.26	6.7	1.7
119	..	1.39	0.49	0.89	2.64	0.23	7.7	2.3
123	8	1.13	0.38	0.60	2.52	0.16	7.0	2.4
139	..	1.30	0.42	0.43	2.37	0.46	7.2	2.2
152	L + A ..	1.40	0.44	0.43	2.10	0.46	7.8	3.1
155	..	1.60	0.46	0.52	1.65	0.59	7.1	—
156	..	1.50	0.42	0.68	1.70	0.37	7.3	3.1

The manurial trial was started in 1953 and so far no improvement in the condition of the trees was observed, nor was there any appreciable difference in lime and potash status of the leaves and soils. However, consistent increase in the lime and potash content of leaves of both treated and control palms was observed.

(b) *Effect of application of potash at graded higher doses.*

*Previous work:* Potash at 1.5 lb., 3.0 lb. and 4.5 lb. per tree as muriate of potash over a basal application of the normal dose of nitrogen and phosphoric acid were applied (the higher doses in two split doses) to diseased trees, each treatment being replicated five times. Observations on the condition of the palms were recorded and leaf samples were collected for analysis of plant food elements before the manurial application.

*Present work:* 15 leaf samples from the experimental trees were analysed for plant nutrient status.



At the highest level of potash applied i.e. 4.5 lb.  $K_2O$  per tree, slight increase in  $K_2O$ ,  $P_2O_5$ ,  $CaO$  and  $MgO$  was noticed in the leaf samples. The data are presented in Table XXV.

TABLE XXV

Results of analysis of leaf samples from the experimental trees supplied with higher dose of potash.

Tree No.	Block No. and Treatment	Total Nitrogen N%	HCl soluble $P_2O_5\%$	HCl soluble (Lime) $CaO\%$	HCl Soluble Potash $K_2O\%$	HCl Soluble Magnesia $MgO\%$
68	Block VI 0.75 lb. N, 0.5 lb. $P_2O_5$ , 1.5 lb. $K_2O$	1.49	0.37	0.45	1.38	0.20
71	"	1.55	0.40	0.53	1.41	0.32
103	"	1.68	0.39	0.56	1.39	0.32
110	"	1.37	0.29	0.50	1.86	0.32
158	"	1.76	0.33	0.42	1.82	0.16
76	Block VI 0.75 lb. N, 0.5 lb. $P_2O_5$ , 3 lb. $K_2O$	1.54	0.39	0.67	1.59	0.36
92	"	1.53	0.44	0.53	1.58	0.28
93	"	1.57	0.38	0.56	1.14	0.36
102	"	1.41	0.44	0.60	1.57	0.36
163	"	1.46	0.41	0.62	3.30	0.68
8	Block VIII 0.75 lb. N, 0.5 lb. $P_2O_5$ , 4.5 lb. $K_2O$	1.59	0.33	0.67	1.83	0.36
19	"	1.64	0.39	0.68	1.89	0.32
48	"	1.47	0.42	9.56	3.35	0.32
64	"	1.46	0.47	0.48	4.2	0.48

- (c) *Supply of nutrients through surface induced roots of diseased palms with special reference to magnesium sulphate.*

*Previous work:* Magnesium sulphate at 2 lb. (in two doses) per tree was applied to diseased palms in heaps of soil around their bases where surface roots were induced to grow. Leaf samples were collected from the experimental palms periodically and were analysed for N, P, K, lime and Mg.

*Present work:* Analysis of leaf samples was continued.

An increase in the nutrient content of leaves particularly that of magnesium was observed. The general condition of the trees showed some improvement after the treatment was started.

5. *Examination of tissues of healthy and diseased palms.*

*Object:* To study the difference in composition of leaves of healthy and diseased palms.

- (a) *Micro and macro nutrient contents of leaves.*

*Previous work:* Leaf samples collected from healthy and diseased palms under item 1 were analysed for N, P, K, Ca, Mg., loss on ignition, silica and insolubles. Fe was also estimated in five of the samples.

*Present work:* Analysis of leaf samples was continued. The data are presented in Tables XXVI and XXVII. Difference in composition of representative whole leaflets, leafy portion alone and midribs alone were also studied in two diseased and healthy palms. The results are given in Table XXVIII.

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TABLE XXVI

Tissue (leaf) analysis – for macronutrients.

Lab. No.	Locality	Healthy or Diseased	Total N%	HCl soluble P <sub>2</sub> O <sub>5</sub> %	HCl soluble K <sub>2</sub> O %	HCl soluble lime CaO %	HCl soluble Magnesia MgO %	Ash %	Insoluble Silica %
4/56	Paramananda swamy, Amma-diar Koilvilai, Ettambulai	Healthy	1.38	0.375	0.58	0.46	0.44	7.4	0.36
8/56	Sri K. Rama-krishna Rao, Collachel, S. Travancore.	„	1.31	0.456	0.93	0.47	0.10	7.4	0.37
15/56	R. C. R. S. Pachalur	„	1.55	0.443	1.44	0.53	0.29	6.4	0.23
19/56	I. Padmanabhan, Pettai, Trivandrum	„	1.51	0.355	0.86	0.32	0.30	4.6	0.17
23/56	Vengavillai, Nedumangad	„	1.27	0.337	1.66	0.34	0.33	5.7	0.16
17/56	K.Vasudevan Vamanapuram Village	Diseased	1.51	0.414	—	0.29	0.28	8.6	0.35

TABLE XXVII

Tissue (leaf) samples from healthy and diseased trees (Micronutrients).

Lab. No.	89	90	91	92	93
	Healthy.	Root Disease	Root Disease	Root Disease	Root Disease
Fe. ppm. (Iron) (parts per million)	190.0	170.0	430.0	475.0	300.0

TABLE XXVIII.

Tissue (leaf) analysis of healthy and diseased palms of  
Central Coconut Research Station garden.

Tree No.	Healthy or diseased	Portion of leaf analysed	Total Nitrogen N %	HCl Soluble P <sub>2</sub> O <sub>5</sub>	HCl Soluble K <sub>2</sub> O %	HCl soluble Lime CaO%	HCl Soluble Magnesia Mg O%	Dry Matter %	Insolu- ble silica%	Origi- nal Mois- ture %
102	Healthy	Full leaf	1.46	0.40	—	0.65	0.39	—	1.3	—
		Leaf portion alone	—	0.31	1.29	0.44	0.23	44.36	1.3	55.64
		Mid rib alone	—	0.48	0.13	0.42	0.30	59.84	—	40.16
181	Healthy	Full leaf	1.50	0.59	1.55	0.63	0.30	—	1.25	—
		Leaf portion alone	—	0.33	1.1	0.40	0.21	44.31	1.30	55.69
		Mid rib alone	—	0.50	0.17	0.42	0.40	60.74	—	39.26
204	Early stage of disease	Full leaf	1.27	0.47	1.45	0.49	0.35	—	2.3	—
		Leaf portion alone	—	0.33	1.29	0.44	0.11	46.1	2.3	53.9
		Mid rib alone	—	0.55	0.21	0.25	0.40	60.1	—	39.9
271	Advanced stage of disease	Full leaf	1.50	0.48	2.10	0.32	0.21	—	2.2	—
		Leaf portion alone	—	0.31	2.0	0.64	0.28	36.6	2.3	63.4
		Mid rib alone	—	0.57	0.60	0.74	0.52	49.3	—	50.7



(b) *Studies on the amino acid content of coconut leaves.*

*Previous work:* The amino acids in coconut leaf were qualitatively determined by the chromatographic method.

*Present work:* The study was continued and methods are being standardised for quantitative assay.

6. *Studies on seasonal foliar yellowing of coconut palms.*

*Object:* To investigate factors responsible for the intense yellowing of leaves during the South West Monsoon (July–August).

(a) *Field studies.*

*Previous work:* 30 palms affected by severe yellowing were under observation. At the time when the yellowing sets in, water table is high and it was measured in 11 pits dug in the Research Station, once a week from June to February for 3 years. The water samples were examined for pH and Specific conductivity. The distillate of the water indicated presence of acetic acid.

*Previous work:* 3 profiles were examined in the affected area and 14 soil samples were collected and analysed for fertility status.

The analytical data revealed a low level of fertility.

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TABLE XXIX  
Analysis of soil samples from seasonal yellowing studies.

Lab. No.	Total Nitrogen N%	HCl Soluble P <sub>2</sub> O <sub>5</sub> %	HCl Soluble K <sub>2</sub> O%	HCl Soluble Lime CaO%	HCl Soluble Magnesia MgO%	Available P <sub>2</sub> O <sub>5</sub> %	Available K <sub>2</sub> O %	pH
1 Sy	0.04	0.011	0.095	0.03	0.05	0.0037	0.0038	6.0
2 Sy	0.02	0.011	0.08	0.01	0.06	0.0039	0.001	5.9
3 Sy	0.03	0.01	0.097	0.01	0.05	0.002	0.0017	5.8
4 Sy	0.02	0.013	0.04	0.02	0.04	0.006	0.005	6.5
5 Sy	0.02	0.016	0.097	0.01	0.06	0.001	0.0028	5.7
6 Sy	0.02	0.025	0.06	0.02	0.05	0.002	0.0017	5.8
7 Sy	0.04	0.011	0.038	0.02	0.02	0.0006	0.008	5.9
8 Sy	0.04	0.007	0.034	0.02	0.04	0.001	0.006	6.0
9 Sy	0.02	Traces	0.062	0.01	0.01	Traces	0.005	5.9
10 Sy	0.03	Traces	0.074	0.01	0.03	Traces	0.003	5.6
11 Sy	0.02	0.006	0.037	0.01	0.02	0.0008	0.001	6.0
12 Sy	0.03	0.01	0.058	0.02	0.04	0.004	0.008	5.8
13 Sy	0.02	Traces	0.07	0.01	0.05	Traces	0.01	5.8
14 Sy	0.02	Traces	0.055	0.01	0.04	Traces	0.001	5.8



(b) *Sand culture experiment.*

*Previous work:* A pot culture experiment was conducted where healthy coconut seedlings were made to grow in garden soil under waterlogged conditions with pH adjusted to 4.5 by means of acetic and lactic acids. Foliar yellowing was observed in the seedlings within 3 to 4 months after starting the experiment.

*Present work:* The same trial was repeated using well washed river sand, the treatments being (i) water logging and (ii) no waterlogging with pH adjusted to 4.5, using acetic acid.

The experiment was conducted for 10 months and no foliar yellowing was observed during that period. The drainage water in the above experiment was found to contain appreciable amounts of ferrous iron (Table XXX).

TABLE XXX.

*Seasonal yellowing studies – Sand culture experiment*  
Iron content of drainage water.

Treatment	Pot No.	Iron (Fe++) parts per million
Water logging with pH adjusted to 4.5	1	139.5
"	4	161.8
"	5	111.6
"	7	334.8
"	9	340.4
"	10	50.2
"	12	156.2
"	13	139.9
"	14	16.7
Control	8	Nil

The experiment will be modified as recommended by the Expert Reviewing Committee and will be included as part of the studies on reduction products of coconut soils.

7. *Advisory.*

During the period under report 44 soils and one manure sample were analysed and suitable advice was rendered to the coconut growers.

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### Programme of Work for 1958 - 59.

#### Entomological Investigations.

I. *Investigations on the rhinoceros beetle (Oryctes rhinoceros L)*

1. General survey.
2. Ecological studies.
3. Insecticidal control.
4. Use of attractants and repellants.
5. Population studies.
6. Biological control.

II. *Investigations on the coconut caterpillar (Nephantis serinopa Meyr)*

1. General survey.
2. Insecticidal control.
3. Biological control.
4. Ecological studies.
5. Study of parasites and predators.
6. Studies on DDT residues on coconut and other products.

III. *Investigations on the palm weevil (Rhynchophorus ferrugineus F)*

1. General survey.
2. Study of the biology and bionomics.
3. Symptomatology studies.
4. Insecticidal control.
5. Search for parasites and predators.



IV. *Investigations on the cockchafer beetle (Leucopholis coneophora Burm)*

1. General survey.
2. Biology and binomics.
3. Control measures.

V. *Investigations on minor pests including pests of copra.*

**Plant Pathological Investigations.**

VI. *Leaf disease.*

1. Investigations on the incidence of leaf-rot in coconut during the different months of the year.
2. Fungal infection in relation to nutritional status of the palm.
3. Study of the lethal dose of fungal cultures.
4. Comparative efficacy of fungicides in controlling leaf rot.

VII. *Root (wilt) disease.*

1. Studies on the infection of palms with *Rhizoctonia solani* as related to waterlogged/acidic condition.
2. Studies of the micro organisms present in the root sap of palms.
3. Defective starch metabolism and fungal infection in palms their relationship in the incidence of disease.

VIII. *General.*

1. Study of the behaviour of seedlings raised from healthy and diseased palms.
2. Effect of summer irrigation on healthy and diseased palms.
3. Manuring-cum-spraying trials.

**IX. Plant Physiological Investigations.**

1. Symptomatology of the root (wilt) disease and the rate of deterioration due to the disease.
2. Micronutrient experiment.
3. Injection trials.
4. Anatomical studies.
5. Studies on root exudation.
6. Aerial roots as channels of food.

7. Transpiration, respiration and photo-periodic trials.
8. Studies on the root system of coconut palms.
9. Miscellaneous studies.

#### X. Chemical Investigations.

1. Study of soils and leaf tissues from healthy and diseased coconut areas of Travancore-Cochin.
  2. Effect of cover crop on disease.
  3. Effect of sulphur on diseased palms.
  4. Studies on the seasonal foliar yellowing of palms.
  5. Studies on nutritional aspect of coconut palm by intensive manuring – curing the disease and checking the incidence of disease in underplanted palms in the pre-bearing stage.
  6. Waterlogging in relation to incidence of disease.
  7. Investigations on reduction products of soil and toxic substances formed under waterlogged soil conditions.
  8. Assay of amino acids of coconut leaves.
  9. Studies on the role of silica in plant nutrition and disease of coconut palms.
  10. Assay of micro nutrients in healthy and diseased leaf tissues.
  11. Advisory work.
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### PART II.

#### Second Five-Year Plan Schemes.

#### Technical Programme of Work for 1957 - 58.

##### Scheme I. *Insecticidal control of the Rhinoceros beetle.*

1. Survey of the coconut gardens on the West coast and selection of a demonstration plot.
2. Incidence of beetle attack in the selected area.
3. Location of the breeding sites.
4. Treatment of all breeding places with 0.01 per cent BHC.
5. Provision of traps.
6. Record of yield



**Scheme II.** *Ecological studies on Nephantis serinopa.*

1. Survey of the coconut gardens on the West coast and location of observational sites.
2. Record of the intensity of pest attack.
3. Pest population studies.
4. Record of field parasitisation.
5. Record of meteorological data.
6. Comparative studies on the biology and incidence of the pest in coconut plantations, thickly and thinly planted as well as in isolated gardens.

**Scheme III.** *Studies on the microflora of coconut soils.*

1. Collection of soil and root (coconut) samples from the healthy and diseased areas representing the different soil types in Travancore-Cochin.
2. Evaluation of the microflora of the soil and root samples with special reference to fungi.
3. Collection of soil and root samples from the coconut growing areas of Madras and Mysore and determination of the microflora of these samples.

**Scheme IV.** *Investigations in Virus Pathology.*

1. Symptomatology of the root (wilt) disease of coconut.
2. Survey of insect population in coconut gardens.
3. Disease transmission trials.
4. Histological studies.
5. Host range studies.

**Scheme V.** *Physiology of the nutrition of the coconut palm.*

1. Studies on the nutritional exhaust of the palm both healthy and diseased.
2. Studies on the deficiency symptoms of macro nutrients in coconut seedlings.
3. Studies on the accumulation and translocation of food in the healthy and diseased palms.
4. Effect of nutrients, curatives, stimulants, etc., fed through cut ends of roots on diseased palms.

5. Absorption of nutrients by coconut palms, in health and disease.
6. Carbon assimilation in coconut palms in health and disease.

**Scheme VI** *Collection of comparative data of soils and plant materials from healthy and diseased coconut areas in Travancore-Cochin.*

1. Soil survey of each village of diseased and healthy regions starting from the southernmost district of Trivandrum.
2. Demarcation of soil boundaries, collection of agronomic data and soil data by examination of soil profiles and collection of soil and leaf samples from healthy and diseased areas of each soil type.
3. Examination of soil and plant materials in the laboratory for comparison of data.

**Note:** Second Five-Year Plan Schemes started functioning only in March 1958 with the appointment of the necessary staff. Hence it was not possible to implement the proposed technical programme in full.

### **Report of work done under the Second Five-Year Plan Schemes.**

#### **I. *Insecticidal control of the Rhinoceros beetle.***

Rhinoceros beetle is the most ubiquitous pest of the coconut palm causing heavy damage. Studies so far conducted reveal that BHC (Benzene Hexa Chloride) satisfactorily controls the pest. Further investigation on this method of control was taken up. A survey of the pest infested areas on the coast is being carried out for the location of demonstration fields in ryots gardens to work a pilot scheme for the insecticidal control of the beetle.

#### **II. *Ecological studies of *Nephantis serinopa* Meyr.***

The coconut caterpillar *Nephantis serinopa* is one of the serious pests of the palm in coastal and littoral areas. Investigations to study the ecological factors responsible for the localised infestation of the pest and the population of its parasites and predators are in



progress. An extensive survey of the coconut gardens in the coastal and littoral tracts was taken up to locate suitable plots for this work.

### III. *Studies on the microflora of coconut soils.*

Earlier investigations on the microflora of coconut soils and rhizosphere showed that quantitatively and qualitatively the microflora varied with the type of soil and the condition of the palm (healthy or diseased). A detailed survey to assess the role of micro-organisms on the incidence of the root (wilt) disease of the palm was taken up. Evaluation of the microflora of the soil and roots collected from a diseased locality, viz. the Research Station garden, is in progress.

### IV. *Investigations in Virus Pathology.*

Studies on the symptomatology of the root (wilt) disease carried out during this period included observations on the visual symptoms and calorimetric tests. Histopathogenic studies of the healthy and diseased palms were in progress. Disease transmission trials mechanically as well as by insect transmission on young and adult palms were conducted. Other items of work carried out were the studies on alternate hosts and the insect population in a diseased area.

### V. *Investigations on the Physiology of the nutrition of the coconut palm.*

The items of work which were in progress during the period are:

#### 1) *Studies on the nutritional exhaust in coconut palms.*

Morphological observations of 48 trees, both healthy and diseased are being recorded. Determination of the dry matter contents of the different parts of the palms and analysis of representative samples of leaflets and petioles of the experimental palms for N, P, K, Ca and Mg are in progress.

#### 2) *Studies on the deficiency symptoms.*

Preliminary arrangements were made to set up a pot culture experiment to study deficiency symptoms of macronutrients on coconut seedlings.

3) *Effect of nutrients, curatives and stimulants fed through cut ends of roots on diseased palm.*

Hormones like Indol Acetic acid, Indol butyric acid and Indol propionic acid at different concentrations were administered to one-year old and five-year old seedlings. The response of the seedlings is being observed.

VI. *Collection of data of soils and plant tissues from healthy and diseased areas of Travancore-Cochin.*

Two types of soils, the coastal sandy and a laterite were surveyed and the characteristics studied. The Research Station garden representing the sandy type was surveyed in detail. The soil is laomy sand in texture, loose in consistency, free from accumulation of salts or concentrations of kankar and is moderately well drained. A typical laterite belt in Changanacherry was surveyed. A shallow gravelly type and another of medium depth with sandy loam texture were noticed. The soils from both types were collected for laboratory examination.

**Programme of work for 1958-59**

I. *Insecticidal control of the Rhinoceros beetle.*

1. Study of the pretreatment population of the pest.
2. Record of the yield data of the palms in the treated area.

II. *Ecological studies of *Nephantis serinopa* Meyr.*

1. Study of the population of the pest.
2. Study of the population of the parasites of the pest.
3. Study of the environmental conditions.

III. *Studies on the microflora of coconut soils.*

1. Study of the microflora of coconut soils of Kerala from diseased as well as healthy areas.
2. Collection of soil and root samples from the coconut growing areas of Madras and Mysore and determination of the microflora of the samples.



IV. *Investigations in Virus Pathology.*

1. Histopathogenic studies.
2. Serological tests.
3. Symptomatology.
4. Disease transmission trials.
5. Studies on insect population.
6. Host range studies.

V. *Investigations on the Physiology of the nutrition of the coconut palm.*

1. Studies on the nutritional exhaust of the coconut palm.
2. Studies on deficiency symptoms.
3. Studies on the accumulation and translocation of food in healthy and diseased palms.
4. Effect of nutrients, curatives and stimulants fed through cut ends of roots on diseased palms.
5. Absorption of nutrients by coconut in health and disease.
6. Carbon assimilation in coconut in health and disease.

VI. *Collection of data of soils and plant tissues from healthy and diseased coconut areas of Travancore-Cochin.*

1. Detailed soil survey of healthy and diseased areas of Travancore-Cochin and collection of soil samples.
  2. Collection of leaf samples from healthy and diseased palms of the above regions.
  3. Analysis of soil and leaf tissues collected during the survey and comparison of the data of soils and plant materials of healthy and diseased regions.
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## APPENDIX IV

### Secretary's Note

*Subject No. 13.* Progress report on the Central Coconut Research Station, Kasaragod for the year ended 30-6-1958.

A copy of the progress report mentioned above, received from the Joint Director, Central Coconut Research Station, Kasaragod is attached. As usual, copies of a summary of the report have been sent to the Indian Council of Agricultural Research for scrutiny by the Scientific Committees of the Council. The Indian Council of Agricultural Research have intimated that their Scientific Committees had no comments to offer on the previous year's report.

During the year under report, 8,490 selected coconut seedlings were distributed from the nursery at the station.

The latest position regarding the construction works at the station is indicated below:

1) *Laboratory-cum-Office Building.* The construction of the building as well as electrical installation have been completed and the building has been fully occupied by the different sections and the office of the Station. The construction of an over-head tank for supplying water in the building has also been completed.

2) *Glass House (II Plan).* The work was awarded by the Central Public Works Department to the contractor in August 1958. The work is in progress.

3) *Construction of a garage (II Plan).* The estimated cost of construction of garage has been remitted to the Central Public Works Department and they have invited tenders for the work.

4) *Hostel for Trainees (II Plan).* The administrative approval of the Government of India for the revised estimate of the work amounting to Rs. 77,890 has been received and the estimated cost will be remitted to the Central Public works Department only early in 1959-60 as the necessary provision for the work has been made in that year's budget.



The technical posts sanctioned for the Station under II 5 -Year Plan have been filled up except the post of Chemical Engineer which is being advertised. The post of Botanist at the Station is also being advertised.

*Remarks of the Committee on the previous year's report.*

The Committee at its last meeting while approving of the progress report on the Station for the year ended 30-6-1957, had decided that (1) a phased programme should be drawn up to replace the low-yielding palms at the Station with high-yielding ones and (2) priority should be given for construction of staff quarters. It is reported that the phased programme is being drawn up by the Director. Provision has been made in the budget of the Station for 1959-60 for the construction of quarters for the Joint Director, Agronomist, Farm Assistant and Watchmen.

The report may be considered first by the Agricultural Research and Development Sub-Committee (Research Wing).

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**Central Coconut Research Station, Kasaragod.**

Detailed report of work done during the year  
ended 30-6-1958.

**I. Botany & Breeding**

*1. Introduction and study of exotic varieties of the coconut*

(a) *Introduction.* An indent for the import of planting material of important varieties of coconut grown in foreign countries had been placed with the Indian Council of Agricultural Research last year for trial at this Station. Consignments from a few countries were received during this year. Details of consignments received are given below;—

Country	Varieties	No. of nuts received in each variety	Condition of the nuts received	No. of nuts sown in the nursery	No. of nuts sprouted
(1) Philip- pines.	a) San Ramon	24	In most of the nuts the water had completely dried up. Out of the 24 nuts of San Ramon vari- ety 9 had sprouted.	23	17
	b) Mangipod	24		14	1
	c) Coconino	24		15	Nil
Received on 13-1-1958.					
(2) British West Indies	a) Tobago	24	In this case also water had dried up in almost all the nuts.	16	Nil
	b) Blanchiss- euse.	24		20	Nil
Received on 15-4-1958.					
(3) Fiji	a) Red	23	do.	18	Nil
	First con- signment received on 28-3-1968.	21		19	Nil
Second con- signment Received on 30-4-1958.	No name	22	In this 18 had sprouted and the sprouts were either dried up or destroyed by rats.	4	Nil
(4) Viet-Nam (Saigon)	a) Cay dua lua lai	10	Out of the 10, 7 were dead sprouts, water in them had completely dried up and only one was in good con- dition.	7	2
	Received on 4-6-1958.				
	b) Cay dua bung	8	Out of 8, 7 were dead sprouts and in the remaining one water had dried up and ball copra had formed.		Nil



The external characters of the nuts were studied and the nuts were planted in the nursery. As the seed nuts are transported by surface route, the condition of the nuts get deteriorated by the time they reach here. Hence it is necessary to have the consignments airlifted if the nuts are to reach here in good condition.

The sprouted nuts 17 of San Ramon variety and one of Mangipod variety are coming up very well. None of the seed nuts of other varieties planted has sprouted so far.

(b) *Study of adult palms.* The study of adult palms of 21 exotic varieties for their different characters was continued. The following varieties gave an yield of more than 100 nuts each last year. They are Laccadives, Fiji, Gangabondam, Dwarf yellow and Strait Settlement Green. High copra content per nut (more than 200 gms) was obtained from varieties like Kappadam, Philippines Leguna, New Guinea, and Strait Settlement Green. The lowest copra content per nut (65 gms) was obtained from the Laccadive Small variety. There was no change in the flower character of the variety Androgena which produces only male flowers. Three nuts, two in October, 1957 and one in April 1958 giving soft buttery kernel and viscous liquid were obtained from the variety Philippines Leguna. Attempts were made to make them germinate under laboratory conditions but without any success.

(c) *Study of seedlings.* The seedlings of different exotic varieties planted in different fields of the Research Station on different dates were studied for their vegetative characters during the course of the year. It was found that –

(i) Among the seedlings of different varieties planted in Hill Block West on 8th October 1955, those of San Ramon, Borneo, Malaya, Guam and Jamaica have made vigorous growth than the rest.

The details are:

<i>Variety.</i>	<i>No. of leaves produced in a year.</i>	<i>Total No. of leaves produced so far.</i>
1. San Ramon	8	28.2
2. Borneo	8.5	27.2

3. Malaya	8	26.5
4. Guam II	8	24.0
5. Guam III	8	23.0
6. Guam I	7.2	25.5
7. Jamaica	7.7	25.2
8. British Solomon Islands	7	23.5
9. Kenya	7.2	20.7
10. Zanzibar	7.2	22.5
11. Seychelles	6.7	21.5
12. West Coast Tall	5.8	17.1

(ii) Among the seedlings of different varieties planted in R. S. 40 on 31-8-1956, those of Guam, Malaya, Jamaica and Java are found to be promising. The details of study are as follows:—

<i>Variety.</i>	<i>No. of leaves produced in a year.</i>	<i>Total No. of leaves produced so far.</i>
1. Borneo	5.0	19.7
2. Jamaica	5.8	20.8
3. Seychelles	5.8	15.6
4. Malaya	6.6	21.3
5. Kenya	5.5	19.2
6. Guam I	6.0	22.0
7. Guam II	6.6	21.0
8. British Solomon Islands	6.3	20.0
9. Java	7.6	16.0
10. Zanzibar	4.5	17.5
11. Panama	4.5	10.5
12. Laccadive ordinary	5.7	14.0
13. Laccadive Dwarf	4.7	14.5
14. Laccadive Small	5.3	12.6
15. Laccadive Micro	6.0	8.6
16. Philippines	5.5	13.5
17. Cochin China	5.0	15.0
18. Fiji	5.7	12.6
19. Andaman	5.0	12.2
20. Andaman Dwarf	5.6	13.0
21. Spikeless	5.4	14.2
22. F. M. S.	5.0	12.5



23. S. S. Green	4.7	12.7
24. S. S. Apricot	3.0	12.5
25. New Guinea	6.0	13.3

(iii) Among the Malayan and Andaman varieties planted in R. S. 27 South on 29-5-1952, the seedlings of Tall Green among Malayan varieties and those of Andaman Round among Andaman varieties have registered vigorous growth than the rest. The leaf production data of these varieties are given below:-

*Malayan Varieties.*

<i>Variety.</i>	<i>No. of leaves produced in a year.</i>	<i>Total No. of leaves produced so far.</i>
1. Tall Green	9.7	45
2. Dwarf Yellow	9.5	48
3. Dwarf Green	9.6	48.6
4. Dwarf Orange	9.6	43.3

<i>Andaman Varieties.</i>	<i>No of leaves produced in a year.</i>	<i>Total No. of leaves produced so far.</i>
1. Andaman Round	9.3	43.3
2. Andaman Strongly ribbed nut	8.5	40.5
3. Andaman Triangular large nut	7.0	37.5
4. Andaman Normal nuts	8.5	40.0

(iv) Seedlings of a few varieties planted in Field XI S. E. on 4-7-55 were also studied and the observations are recorded below:-

1. Seychelles	7.6	25
2. San Ramon	7.6	29.6
3. Laccadive Micro	8.0	23.0

2. *Study of Indigenous Varieties.*

The seedlings of indigenous varieties under trial at this station were regularly observed for their growth characters. Among the three varieties of East Godavari studied the seedlings of Gangabhavani are found to be more promising in growth characters than those of the rest namely Rangoon Kobbari and Verri Kobbari. Similar

observations were made on the seedlings obtained from Orissa and on those of Gangabondam raised at this Station. The data gathered are recorded below:—

<i>Variety.</i>	<i>No. of leaves produced in a year.</i>	<i>Total No. of leaves produced so far.</i>
1. Gangabhavani	6.8	23.2
2. Verri Kobbari	6.2	20.6
3. Rangoon Kobbari	6.5	25.0
4. Orissa	8.5	24.1
5. Gangabondam	9.0	24.6

### 3. *Trial of new varieties.*

The study of the following varieties planted in 1952 was continued. (1) Chowghat Dwarf Orange (2) Chowghat Dwarf Green (medium) (3) Chowghat Dwarf Green (small), (4) Chowghat Dwarf Orange (natural cross) (5) Ordinary Tall (6) Tall  $\times$  Dwarf (hybrid) and (7) three seedlings of Dwarf Green (Nileshwar) planted in 1953. The annual average rate of production of leaf of these varieties is as follows:—

Chowghat Dwarf Orange	7.2 leaves
Chowghat Dwarf Green (medium)	8.0 "
Chowghat Dwarf Green (small)	10.8 "
Chowghat Dwarf Orange (natural cross)	7.6 "
Ordinary Tall	4.0 "
Tall $\times$ Dwarf (hybrids)	5.2 "
Dwarf Green (Nileshwar)	7.3 "

The seedlings of Chowghat Dwarf Green (small) continue to be vigorous in growth while those of the ordinary tall variety least vigorous.

Among the seedlings of the six different varieties planted on the same day i. e., 25-8-1952 only 4 seedlings of Chowghat Dwarf Green (small), one seedling of Chowghat Dwarf Green medium and two seedlings of Chowghat Dwarf orange have flowered so far. Both the seedlings of Chowghat Dwarf Orange flowered this year one in November, 1957 and the other in February 1958. One seedling out of the four Chowghat Dwarf Green (small) flowered appears to be a natural cross as the nut and copra characters resemble those of the ordinary tall



variety. It appears to be a high yielder. It has produced as many as 262 flowers in an inflorescence and the setting also seems to be quite good. The copra obtained from two nuts harvested from this tree appears to be quite good in quality and the copra content per nut is about 220 gms.

4. *Study of species of Cocos other than Cocos nucifera Lin.*

Regular observations on the three palms representing the three species of cocos namely *Cocos plumosa*, *Cocos schizophylla* and *Cocos australis* were taken and recorded during the year. Seedling of *Cocos schizophylla* and *Cocos australis* raised from well matured seed nuts of the above palms and those of *Cocos coronata* Mart raised from seed nuts obtained from Brazil are under study.

*Cocos australis.* The rate of growth of this palm continues to be very slow. As reported already it is regular in producing spathes but the setting is very poor. The seedlings raised from nuts obtained last year are coming up well. The study of the male and female phases of the flower has revealed that there is mainly self pollination in this species. The seedlings are about two years old. They produce about 4 to 5 leaves in a year. The leaves are very short.

*Cocos schizophylla.* This palm is also a regular producer of spathes and the setting percentage is also quite good. In this case the study of phases has shown that there is mainly cross pollination. The seedlings raised from the nuts of this palm are about 3 years old. They are very slow in growth.

*Cocos plumosa.* This palm has produced four spathes during this year. Each spathe takes about four months to develop and mature. The setting percentage is good but the germination of the nuts is poor. A few seedlings raised from nuts last year did not survive. Attempts are being made to raise seedlings from the nuts obtained this year.

*Cocos coronata* Mart. The seedlings raised from nuts obtained from Brazil are about three years old. The

seedlings put forth very long leaves. They also produce about 3 to 4 leaves in a year. The growth of these seedlings also is very slow.

### 5. *Study of mother palms.*

The study of mother palms was continued and a revised list of mother palms of about 850 in number, was prepared after a careful study of the palms. The seedlings of selected palms are being raised for studying the performance of their progenies.

### 6. *Hybridisation.*

Hybridisation work for the season was taken up in January and continued till the middle of May.

The following economic crosses were repeated for the production of hybrids for supply to the cultivators.

- (1) Tall female x Dwarf male
- (2) Tall female x Gangabondam male
- (3) Tall female x Laccadive ordinary male

The following experimental crosses were repeated for a study of their progenies.

- (1) Tall female x S. S. Apricot male
- (2) S. S. Apricot female x Tall male
- (3) Gangabondam female x Tall male
- (4) Spicata female x S. S. Apricot male
- (5) Spicata female x Dwarf male
- (6) S. S. Green female x S. S. Apricot male
- (7) S. S. Green female x Andaman Dwarf male
- (8) Large female x Small male
- (9) Small female x Large male
- (10) Laccadive ordinary female x Andaman Dwarf male
- (10) Andaman Dwarf female x S. S. Green male

*Crosses between world varieties.* The following crosses were repeated:—

- 1) Fiji female x S. S. Green male
- 2) Cochin China female x S. S. Green male
- 3) F. M. S. female x S. S. Green male
- 4) Philippines female x S. S. Green male



The cross between two Tall x Dwarf hybrids was continued.

1. T x D ( $F_1$ ) female x T x D ( $F_1$ ) male

A total number of 8593 female flowers from 317 inflorescence of 82 selected trees were cross-pollinated during this season. One inflorescence from each tree was left for open pollination in order to study the effect of different pollinations on the yield.

A total number of 3312 hybrid nuts obtained from different crosses made last year were sown in the nursery during the end of May. The nuts obtained from bunches left for open pollination were also sown in the nursery in order to continue the comparative study of the seedlings obtained by both types of pollination.

7. *Study of optimum parental combination in Tall x Dwarf.*

The Tall x Dwarf hybrid seedlings of different parental combinations planted in Hill Block West on 23-10-1956 were studied for their growth characters. The details of leaf production of these seedlings are given below.

		No. of leaves produced in a year.	Total No. of leaves pro- duced so far.
I.	(a) 1/76 female x IX Ext./56 male	5	15
	(b) do.	4	15
	(c) do.	5	15
	(d) do.	6	16
	Average	5.0	15.5
II.	(a) I/76 female x IX Ext./34 male	6	15
	(b) do.	8	18
	(c) do.	7	17
	(d) do.	7	17
	Average	7.0	16.7
III.	(a) 1/76 female x IX E./23 male	5	16
	(b) do.	6	15
	Average	5.5	15.5

I.	(a)	VIII/23 female x IX E./56 male	7	18
	(b)	do.	6	17
		Average	<u>6.5</u>	<u>17.5</u>
II.	(a)	VIII/23 female x XI/71 male	6	15
	(b)	do.	6	15
	(c)	do.	7	18
	(d)	do.	6	14
		Average	<u>6.2</u>	<u>15.5</u>
III.	(a)	VIII/23 female x IX/E./ 23 male	6	17
	(b)	do.	6	16
	(c)	do.	5	15
	(d)	do.	6	15
		Average	<u>5.7</u>	<u>15.7</u>

From the observations it is evident that with regard to the first female parent namely I/76, the combination with the male parent IX E/34 is promising and with regard to the second female parent VII/23 the combination with the male parent IX E/56 seems to be good. The study is being continued.

For planting this year the following seedlings of four female parents with different male parents have been selected.

a)	I/58 female x XI/71 male	—	3 seedlings.
	I/58 open pollinated	—	3 seedlings.
b)	I/182 open pollinated	—	4 seedlings.
	I/182 female x IX E/156 male	—	4 seedlings.
	I/182 female x IX E/45 male	—	2 seedlings.
c)	II/62 open pollinated	—	2 seedlings.
	II/62 female x IX E/45 male	—	4 seedlings.
	II/62 female x XI/71 male	—	4 seedlings.
	II/62 female x IX E/56 male	—	3 seedlings.
d)	II/95 female x IX E/45 male	—	3 seedlings.
	II/95 female x IX E/56 male	—	3 seedlings.
	II/95 female x XI/71 male	—	4 seedlings.
	Total	—	<u>39 seedlings.</u>

These seedlings will be planted in Hill Block West immediately after the cessation of rains.



# 8. *Study of hybrids and their progenies.*

## a) *Study of hybrid palms and their progenies.*

The Tall x Dwarf hybrids planted in 1940 in Field XI N. E. continue to be under observation for their yield characters. Their yields in 1957 are Tree No. 18-121, Tree No. 19-100 and Tree No. 20-60. The Tall x Tall hybrids gave high yields in 1957, their yields being for tree No. 21-114 and tree No. 22-89. The study of natural cross dwarf trees planted in the same field was also continued. All the eight trees of natural cross dwarf continue to maintain their high yielding character. Their yields in 1957 were Tree No. 1-125; No. 2-93; No. 3-86; No. 4-107; No. 15-135; No. 68-69; No. 69-86 and No. 76-141.

The  $F_2$  progenies of Tall x Dwarf hybrids (Nos. 18, 19 and 20 in Field XI planted in Field R. S. 39/2-1 in 1952 have not made satisfactory growth. Only one progeny of Tree No. 18 has flowered so far. That seedling has produced only three spathes, and all the female flowers from these spathes have shed. The  $F_2$  progenies planted in the lower portion of the same field in 1954 have registered vigorous growth. One of the seedlings flowered in December 1957 i. e., within  $3\frac{1}{2}$  years from the date of planting. In this seedling also all the female flowers have shed.

## b) *Study of new hybrid seedlings.*

The study of progenies of promising crosses planted in Hill Block West in October 1955 was continued. The average number of leaves produced by them and also the total number of leaves produced by them so far are given below.

Cross	No. of leaves produced in a year	No. of leaves produced so far
1. Draf Green female x Dwarf Orange male.		
a) IX/23 x XI/71	7.5	23.2
b) IX E/34 x IX E 56	8.0	23.2
2. Dwarf Yellow female x Dwarf Green male.		
a) XI/62 x IX/23	7.5	24.5
b) XI/62 x IX E/34	8.5	26.5

3. Dwarf Orange female x Dwarf Green male.  
a) IX E/56 x IX E/34 8.0 25.7
4. Gangabondam female x Dwarf Yellow male.  
XI/70 x XI/62 7.0 22.2
5. Tall female x Gangabondam male.  
VIII/56 x XI/70 7.2 20.7
6. Large female x Small male.  
XI/47 x O. C. 27 7.0 23.0

The observations indicate that Dwarf crosses in general are more vigorous than the rest.

The hybrids of other different crosses planted in Hill Block West in October 1956 were studied. The details are as follows:—

1. Tall female x Laccadive male.  
II/27 x XI/42 3.5 12.5
2. Laccadive Ordinary female x Andaman Dwarf male.  
XI/42 x XI/73 4.2 13.0
3. Andaman Dwarf female x Laccadive Ordinary male.  
XI/73 x XI/42 5.5 14.5
4. Tall female x Gangabondam male.  
I/24 x XI N. W./2 5.5 16.0  
VIII/56 x XI/N.W./1 4.5 14.5
5. Gangabondam female x Tall male.  
XI/NW/1 x VIII/56 5.6 15.0
6. Large female x Small male.  
XI/47 x XI/27 5.6 16.3
7. Small female x Large male  
XI/27 x XI/47 4.5 13.0
8. S. S. Green female x Andaman Dwarf male.  
XI/74 x XI/73 4.4 14.6
9. Andaman Dwarf female x S. S. Green male.  
XI/73 x XI/74 5.0 14.0
10. Dwarf Orange female x Gangabondam male.  
IX E/56 x XI/NW 5.2 14.7
11. Laccadive Ordinary female New Guinea male.  
XI/41 x XI/46 5.0 16.2



12. S. S. Apricot female x Gangabondam male.  
 XI/62 x XI/N. W./1 4.0 17.0

Among them the seedlings of Large x Small, Lacca-  
 dive Ordinary x New Guinea, S. S. Apricot x Gangabo-  
 ndam and Tall x Gangabondam appear promising.

From this year's nursery the seedlings of the follow-  
 ing crosses have been selected for planting.

1. S. S. Green female x S. S. Apricot male	4 seedlings
2. Tall female x Spicata male	4 „
3. Spicata female x Tall male	4 „
4. T. x D. (F <sub>1</sub> ) female x T x D (F <sub>1</sub> ) male	22 „
5. S. S. Apricot female x Gangabondam male	4 „
6. Dwarf Orange female x Gangabondam male	4 „
Total	<u>42 „</u>

These seedlings will be planted in Hill Block West  
 at the end of the monsoon period.

- (c) *Comparative study of seedlings of Natural Cross  
 Dwarf (dwarf female x tall male and those of dwarf  
 (self pollinated).*

The seedlings of natural cross dwarf and those of  
 dwarf raised from seednuts of both green and yellow  
 types obtained from Chowghat were planted in East  
 Block on 4-9-1957. The number of seedlings planted in  
 each type are

Green	—	Natural Cross dwarf seedlings	4
		Dwarf seedlings	3
Yellow	—	Natural cross dwarf seedlings	13
		Dwarf seedlings	10

These seedlings are being studied regularly for their  
 vegetative characters. Though the natural cross dwarf  
 seedlings appear to be vigorous in growth the number of  
 leaves produced so far is less than those produced by the  
 dwarf seedling.

- |   |              |
|---|--------------|
| 1. Green Natural cross dwarf seedlings  | 12.7 leaves. |
| Dwarf seedlings                         | 15.0 „       |
| 2. Yellow Natural cross dwarf seedlings | 14.0 „       |
| Dwarf seedlings                         | 14.2 „       |

The study is being continued.

# 9. Study of the inheritance of colour in the coconut.

This item, of work has been taken up recently. The study is at present confined to the examination of the colours of the progenies of the pure coloured parents namely green yellow and red selected for the study. Well matured seed nuts harvested from these selected trees during the months February to May have been sown in the nursery. The seedlings raised from these three types will be studied in detail for their colour characters. Three trees in each type have been selected. A total number of 250 seed nuts obtained from them have been planted in the nursery. The colour of ripe nut, the colour of tender nut, colour of button and colour of petiole and mid rib of the selected trees have been noted and recorded. The details of trees selected and the number of nuts harvested from them and sown in the nursery are given below.

Colour	Tree No.	No. of nuts harvested in			
		Feb.	March.	April.	May.
Green	X/8	4	6	11	—
	X/16	6	4	5	—
	X/23	6	6	5	7
Yellow	X/30	10	6	4	—
	IX/145	13	8	—	11
	IV/103	14	21	6	—
Red	IV/71	6	5	19	—
	IV/94	4	8	14	—
R. S. 40/384		13	12	18	—
Total		76	76	82	18=252

Total number of nuts sown - 250.

# 10. Nursery Studies.

a) *Germination of hybrid nuts.* The dates of germination of hybrid nuts obtained from controlled cross pollination and of those obtained by natural pollination were noted and recorded. Observations made have indicated that in general artificially pollinated nuts germinate earlier than nuts obtained by natural pollination. The seedlings obtained by both types of pollin-



ation are being studied in detail. The measurements of these one year old seedlings are being taken and recorded.

b) *Germination of nuts of exotic varieties.* Similar observations on the germination of nuts of different exotic varieties sown in the nursery were also noted and recorded. Among the different varieties sown, Philippine, Cochin China, Fiji, S. S. Apricot and Ganga-bondam exhibit the early sprouting character.

11. *Study of the Anatomy and development of the fibre in the husk.*

This item has been newly taken up and literature pertaining to this study has been collected and is being referred to. Female flowers from four successive inflorescences of an ordinary West Coast Tall tree have been collected and fixed. Free hand sections of that part of the button which forms the husk later on were taken from a few buttons and colour reactions of the tissues to some of the usual strains were observed.

12. *Study of indentification of prepotent high yielders by comparison of a large number of open pollinated progenies.*

This item of work also has been recently taken up in order to fix up prepotent high yielders among the mother palms by the comparison of seedlings obtained from the open pollinated nuts of these palms. For this study 38 mother palms having an annual yield of more than 100 nuts each, have been selected. As the study has been taken up only recently, only nuts harvested in May could be collected. A total number of 228 nuts obtained from 25 trees were grouped into two sections, namely (a) selected and (b) unselected on the basis of different characters and were sown in the nursery during the first week of June. The seedlings obtained from these nuts will be studied in detail for their vegetative characters.

13. *Coconut Survey.* Information has been collected from the Directors of Agriculture of different States regarding the locality to be surveyed and the time suitable to visit those areas in the different States. A regular programme has been chalked out and the work is

being taken up almost immediately. The Coconut Survey Assistant will survey the important coconut regions of the different States and will gather information on the varieties available in the different regions.

*Study of the performance of seedlings supplied to the different parties from this Station.* This item of work has been taken up in order to have a proper appraisal of the performance of the seedlings (mainly hybrids and varieties) supplied from this Station. Replies received from different parties in Madras State to a query sent to them regarding the performance of seedlings supplied to them are very encouraging. Almost all the replies received have gone to show that except for a few casualties here and there, the performance of the seedlings has been quite good. The Coconut Survey Assistant will study the performance of the seedlings during his tour of survey work.

14. *Publications.* The following papers were prepared for publication during the year under report.

- (1) Possibilities of coconut improvement by the introduction of exotic varieties - K. Satyabalan. published in the Coconut Bulletin Vol. XI No. 11, February 1958.
- (2) Coconut breeding - some results - K. Satyabalan.
- (3) Coconut varieties of the Laccadive Islands - K. Satyabalan.
- (4) Coconut breeding - A review - S. R. Gangolly, K. Satyabalan and K. M. Pandalai.
- (5) Varieties of the coconut - S. R. Gangolly, K. Satyabalan and K. M. Pandalai.
- (6) A note on the study of a few exotic varieties of coconut - K. Satyabalan, and P. Chami.

#### **Programme of work for 1958 - '59.**

- 1) Study of exotic varieties of coconut.
- 2) Study of indigenous varieties.
- 3) Trial of new varieties.
- 4) Study of species of cocos other than *Cocos nucifera* Lin.
- 5) Study of mother palms.



- 6) Hybridisation.
- 7) Study of optimum parental combination in Tall x Dwarf.
- 8) Study of hybrids.
- 9) Study of the inheritance of colour in the coconut.
- 10) Nursery studies.
- 11) Study of the anatomy and development of the fibre in the husk.
- 12) Study of the identification of prepotent high yielders by comparison of a large number of open pollinated progenies.
- 13) Coconut Survey work.

## II Cyto - Anatomy.

### 1. *Morphology and Anatomy of the Crown and its Component Parts.*

The developmental morphology of the male and female flowers of the coconut were under investigation during the year and were restricted entirely to the study of the organogeny, embryo-sac development and development of the microspore.

(a) *Organogeny.* The organogeny of the female and the male flowers examined has revealed the acropetelous development of the floral organs.

(b) *Development of the Embryo-sac.* With the completion of investigations on embryo-sac development up to the formation of the archesporial cell reported last year further development of the archesporial cell into the embryo-sac was under investigation. The initiation of the archesporium has been observed to present a rare feature viz., occurrence of multiple archesporium-which has not been reported so far in the coconut. The multiple archesporium has revealed two or three cells in the centre of the nucleus prominently enlarged with a conspicuous nucleus and a denser cytoplasm than that observed in the surrounding cells. Evidence could, however, not be secured to establish whether all these cells develop into an embryo-sac or only one of them develop

while the others degenerate. The embryo-sac development has been observed to follow the "Adoxa Type" of embryo-sac development. The archesporial cell enlarges and directly functions as the megaspore mother cell. The nucleus, on the other hand, divides twice without any wall formation giving rise to four nuclei, characteristic of tetrasporic type. All the resulting four nuclei, are oriented nearly to the four poles of the megaspore mother cell (coenomegaspore). With one more division it has been observed to result in a eight-nucleate embryo-sac-characteristic of the "Adoxa Type" — which has not been clearly reported by previous workers. In the organised and mature embryo sac, antipodals have not been observed and they appear as ephemeral structures and degenerate before the organisation of the embryo-sac and that observation is, however, in conformity with that of previous workers.

Studies on fertilization and post fertilization stages are under investigation and the results are awaited.

(c) *Development of the microspore.*

In respect of the development of the microspore, two or three hypodermal archesporial cells have been observed to initiate in each lobe of the anther, while observations of previous workers is that a plate of hypodermal archesporium is initiated in each lobe. In respect of development of archesporium up to the microspore tetrads the observations are in conformity with those made by previous workers. Different types of microspore tetrads viz., Isobilateral, tetraheadral, T-shaped and linear which have not been noted so far have also been met with. The tapetum has been observed to be of a glandular or secretory type with the tapetal layers showing multi-nucleate condition which has also not been reported by previous workers. The endothelial layer at the time of dehiscence of the microspores has shown fibrous thickening which is a feature of the endothecium which is, however, in conformity with the observations previously recorded.

Observations made so far have thus extended only up to the formation of the microspore tetrads and further studies are in progress.



## 2. Developmental Morphology and Anatomy of the nut.

Studies on the development of the nut from the button to the mature nut stage were continued with the help of traces of outlines of perianth lobes made at weekly intervals. The nuts from each of the long and round type of nuts were selected for study to ascertain the differences in nature of growth of the nuts in these types. The observations so recorded and examined have shown that the nature of growth and maturity in both the types under examination proceeded in almost an identical manner save for little variation. In respect of increase in median circumferencial growth it has been observed to be gradual till about the tenth week after fertilization, although, it was comparatively greater in the round type than that in the long type. The rate of increase in growth has been observed suddenly to rise and assume the highest level in the period extending between the sixteenth and twentieth week after fertilization of the female flower as seen from the data embodied in the following table.

*Table showing the mean increase in m. m. in the median circumferencial growth during the development of the nut:*

Type of Nut.	Number of fortnights after fertilization of the flower.															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	24
Long nut.	18.43	26.71	17.84	17.71	20.28	39.00	34.86	46.30	42.71	26.71	17.00	8.71	0.86	0.00		
	+	+	+	+	+	+	+	+	+	+	+	+	+			
Round nut	21.00	28.00	44.00	38.00	47.00	46.00	45.00	83.00	48.00	69.50	29.50	15.50	11.50	1.50		
	+	+	+	+	+	+	+	+	+	+	+	+	+	+		

All minus readings.

After the twentieth week, the increase in median circumferencial growth gradually decreases till about the twentysixth week after fertilization when it reaches the maximum development. Maturity slowly sets in the



nut after this stage as evident from shrinkage in overall diameter and median circumferencial growth of the nut which, however, becomes marked from about the fortieth week and continues till harvest in about the forty-eighth week after fertilization.

In respect of maturity of the nut, the data recorded has shown that the maturity in the nut sets in first at the apical portion of the nut which gradually extends to the median portion and ends with the basal portion of the nut. This observation is evident from the fact that increase in growth first ceases in the apical part of the nut in about the sixteenth week which is followed by a stalemate in growth till about the twenty-fourth week after which signs of maturity sets in. The basal portion on the other hand gradually increases in growth till about the twenty-ninth week after fertilization and after a stalemate in growth till about the thirty-second week exhibits signs of maturity judged by shrinkage in overall size.

Studies have also been in progress to determine the principal tissue changes occurring in the different parts of the nut during the growing period of the nuts. In order to study the origin and nature of development of the fibre in the husk necessary plant material from the different stages of development have been fixed and processed for paraffin embedding for detailed anatomical study. This is being followed up by a parallel investigation on extraction and estimation of fibre, pith etc., from nuts harvested from bunches of tall, dwarf and hybrid types at monthly intervals to study the relative nature of development of fibre, pith etc., in the three forms and the results are awaited.

### 3. *Cytological Study of the Different Coconut Varieties.*

As a preliminary to detailed cytological study of the different varieties of the coconut, the studies in meiosis in the tall palm was taken up for detailed investigation through paraffin and smear methods. These studies have revealed that the sporogenous tissue after the last mitosis of the archesporium and before entering into the meiosis, presents a compact mass of cells—each polygonal in outline, with denser cytoplasm, prominent nucleus,



a well defined nuclear membrane and the nucleolus lying towards one side of the cell. The pollen mother cells having vacuoles and a prominent nucleus lying almost in the middle of the cell, soon rounds off and enters into meiosis.

The resting stage of the nucleus or the nucleus which is not dividing, steadily increases in size and the structural parts of the nuclear sap, nucleoli and chromatin threads slowly make their appearance. Chromatin threads form a clear mesh work losing their individuality with minute granules or node-like structures distributed uniformly. The resting stage has been observed to last only for a short time for it soon enters into the prophase.

In the elongated prophase of the First meiotic division, even though all stages were not secured, fairly good preparations were made showing some of the important stages. The leptotene stage is seen by the decided enlargement of the nucleus thickening and contraction of the chromatin threads and increase in size of the nodal thickening. The net work also becomes smaller and as the stage advances it is lost. The chromatin threads are brought closer by their gradual contraction and they enter into the next stage of prophase – the zygotene – which is also represented by the synezesis state because of the synezesic knot due to greater contraction of the chromosomes and their pairing. The nucleus is greatly enlarged and the chromatin material appears as a lumpy mass with loops and some globular projections. The nucleolus may or may not be enclosed in the synezesic knot. In a number of squashes of some anthers most of the pollen mother cells were in this stage.

The later stages of prophase could not clearly be obtained except some good diakinesis corresponding to the late prophase. There is greater contraction, thickening and shortening of the chromatids and the splitting of the chromatids has already taken place. Because of the greater thickening and shortening of the chromatids, the split between them becomes more difficult to observe. The nucleolus is apparently non-visible due to its decreasing affinity for the stain. As the spindle fibres



appear the nuclear membrane and the nucleolus disappear completely and the cytoplasm becomes denser. The chromosomes appear more globular, some oval and some like bent rods. At the late diakinesis stage these bivalent chromosomes arrange themselves on the inside of the nuclear cavity. Several counts from different sections and preparations were made. The bivalent numbers observed in most of the cells was sixteen or in rare instances fifteen or fourteen due to overlapping and crowding.

The metaphase stage is represented by the fully formed spindle fibres. The diakinesis bivalents which have undergone complete process of contraction begin to be associated with the developing spindle and arrange at the equatorial plate. The chromosomes, at this stage appear more globular. When all the chromosomes reach the equatorial plate they become evenly arranged in one plane in a very symmetrical manner. This was found to be the favourable stage for counting the bivalent chromosomes. Sixteen bivalent chromosomes, are very clearly evident in most preparations. The arrangement of the heterotypic chromosomes on the spindle are in various patterns and during the late metaphase, mostly side views of the metaphase are obtained, showing the chromosomes arranged radially or tangentially. In some slides examined due to the contraction of the spindles pulling away the bivalent chromosomes, the longitudinal halves of the chromosomes are quite clear.

The Anaphase stage of the 1st Meiotic division is represented by the separation of the daughter chromosomes to the opposite poles. At this stage the chromosomes mostly exhibit "J" or "V" shapes. Various stages of anaphase showing anaphasic separation of the chromosomes are obtained in a number of preparations.

At the telophase stage the daughter chromosomes have already moved to the opposite poles and nuclear membrane round them has definitely formed. At the later stage the chromatin reticulum is formed and the threads are connected by small delicate threads.

In a number of preparations made most of the Pollen Mother Cells in the anther were in the dyad



stage, showing the two daughter nuclei. The nucleolus could not be seen at this stage. Some cells have already started entering for the second meiotic division. It appears that there is nothing resembling a typical resting condition for the telophase nuclei of the 1st division. It definitely passes into the metaphase of the second division. The nuclear membrane breaks down and spindle fibres appear and the whole chromosomes collect at the equatorial plate. A number of II metaphase stages were observed showing the monovalent chromosomes. The exact counts of the monovalent chromosomes could not be made due to overlapping and crowding. The chromosomes at this stage mostly appear globular or as bent rods. The displacement of the two spindle fibres are in varying patterns resulting in the different types of tetrads at the end of the telophase and the II meiotic division. At the end of telophase stage the daughter nuclei are completely formed. They are surrounded by well formed nuclear membrane and the nucleolus are clearly visible.

Detailed study of the meiosis is still in progress and further results are awaited.

#### 4. *Studies in the Coconut Pollen.*

The three aspects of the coconut pollen under investigation during the year comprised the estimation of pollen output from three forms of the coconut *viz.*, tall, dwarf and hybrid; determination of the relationship between atmospheric coconut pollen catches and the trends in production of nuts as well as the climatic features prevailing during the different months of the year and the determination of the relative share of self-pollination, cross-pollination due to insects and wind in the present set of nuts in plantations.

(a) *Pollen Output:* Studies were initiated during the year to estimate the calculated pollen output in the tall, dwarf and hybrid coconut palms taking three representative palms under each of the three groups. The pollen are being collected from individual male flowers from three successive bunches in each of the selected trees. The initial data gathered have shown

that the dwarf orange palms generally contained more male flowers in the inflorescences (Mean 9855) than that observed in either that of the tall or hybrid palms (Mean 5025). In respect of the mean pollen out put in individual inflorsences also the dwarf palms have been observed to contain comparatively more pollen (Mean of 221.30 millions) than that of either tall or hybrid palms (Mean 97.77 millions). The pollen output of inflorescence from dwarf yellow palms has, however, been observed to be comparatively low being only 38.75 millions. The pollen content of male flower borne on the basal spikes in the inflorescence from trees of all the three groups have also been observed to contain comparatively lesser quantities of pollen than that met within the male flowers gathered from the apical and middle portion of the peduncle or axis of the inflorescences.

(b) *Pollen catches and their relationship with production and climatic factors.*

The data on daily coconut pollen catches determined with the help of atmospheric slides during four intervals of the day and corresponding data on yield and climatic features gathered were tabulated and statistically analysed to find out the possible relationship between daily coconut pollen catches and different characters *viz.*, monthly production of nuts and climatic factors.

The results obtained in respect of relationship between monthly pollen catches and production of nuts in relative months have shown that although there is slight relationship between the two judged from the small positive correlation calculated, the relationship is not significant as presented in the following table:—



*Table showing relationship between monthly pollen catches and corresponding yield of nuts.*

Year		Correlation Coefficient	Critical value for correlation coefficient for corresponding levels of significance		Significance
			P = 0.05	P = 0.01	
1956	+	0.467	0.576	0.708	Not significant
1957	+	0.346	do.	do.	do.

In respect of relationship between monthly coconut pollen catches and the different relative climatological features examined, significant relationship has been noticeable only between the monthly pollen catches and the relative mean maximum temperature as seen from the data presented in the following table.

*Table showing the relationship between monthly coconut pollen catches and relative mean maximum temperature.*

Year		Correlation Coefficient	Critical value for correlation coefficient for corresponding levels of significance		Significance
			P = 0.05	P = 0.01	
1956	+	0.622	0.5760	0.7079	Significance
1957	+	0.600	do.	do.	do.

Although slight relationship has been observed between monthly coconut pollen catches and relative mean minimum temperature, difference between mean maximum and minimum temperature, mean wind velocity, the same has not been observed to be significant as is clear from the data presented in the following tables:—

*Table showing relationship between monthly coconut pollen catches and relative mean minimum temperature.*

Year	Correlation Coefficient	Critical value for correlation coefficient for corresponding levels of significance		Significance
		P = 0.05	P = 0.01	
1956	+ 0.372	0.576	0.708	Not significant
1957	+ 0.430	do.	do.	do.

*Table showing the relationship between monthly coconut pollen catches and differences between mean maximum and minimum temperature.*

Year	Correlation Coefficient	Critical value for correlation co-efficient for corresponding levels of significance.		Significance
		P = 0.05	P = 0.01	
1956	+ 0.214	0.526	0.708	Not significant
1957	+ 0.451	do.	do.	do.

*Table showing relationship between monthly coconut pollen catches and corresponding mean daily wind velocity.*

Year	Correlation Coefficient	Critical value for correlation coefficient for corresponding levels of significance.		Significance
		P = 0.05	P = 0.01	
1956	+ 0.166	0.576	0.708	Not significant
1957	+ 0.239	do.	do.	do.



In respect of relationship between monthly coconut pollen catches and corresponding climatological factors *viz.*, mean morning humidity, mean noon humidity, difference between mean morning and noon humidity, hours of sunshine, monthly rainfall and number of rainy days, the data examined has shown that while the relationship is significant in one year, in the other year under observation the relationship noted is not observed to be significant. In addition, it has also been noted that while the relationship observed in one year is positive it has secured a negative relationship in the other year. This has indicated the necessity of repeating the experiment with a more accurate and efficient aeroscope for a number of years to arrive at dependable conclusions,

#### 5. *Studies in shedding of buttons.*

Studies in shedding of buttons in the coconut were continued. During the year a comprehensive trial was undertaken to test the fortifying influence of some synthetic growth promoting substances *viz.*, indole butyric acid and indole propionic acid on 2, 4 dichlorophenoxy acetic acid and with a view to find out a suitable substitute for coconut milk (which is difficult to obtain regularly for large scale spraying) presently used in combination with 2, 4 - dichlorophenoxy acetic acid for spraying against button shedding.

Data on mean percentage set of nuts, number of nuts per bunch, volume of unhusked and husked nut, weight of unhusked and husked nut; copra content of nut and quantity of copra obtained per bunch from the different combination sprays undertaken was tabulated and statistically analysed.

Data analysed in respect of mean percentage set of nuts and number of nuts set in bunches sprayed with different hormone combinations has shown that while all the hormone combination have secured significantly greater set than that secured from the control bunches, no significant differences in mean percentage setting have been noticable between the effects of the different hormone combinations as indicated in the data presented in the following tables:—

*Table showing percentage set of nuts and mean number of nuts set per bunch.*

Treatment	In relation to % set.			In relation to No. of nuts set.		
	Mean set of nuts	Whether significant or not	Critical difference	Mean No. of nuts set	Significance	Critical difference
A. 2, 4, D 30 p.p.m + IP/ A 40 p.p.m.	52.54		9.92 nuts	45.40		9.96 nuts
B. 2, 4-D. 30 p. p. m. + coconut water	50.85	P>0.01 Highly significant		41.40	P>0.05 Significant	9.96 nuts
C. 2,4-D. 30 p.p.m.+IB/A40 p. p. m.	45.50			37.40		
D. Control (water spray)	29.71			21.20		
	Coefficient of variability = 16.13%			Coefficient of variability = 19.89%		
	Conclusions A B C D			Conclusions A B C D		

*Note:-* 2,4-D. = 2, 4-Dichlorophenoxy acetic acid  
 1.P.A. = Indole propionic acid  
 1.B.A. = Indole butyric acid

*Table showing percentage set of nuts and mean number of nuts per bunch.*

Treatment.	In relation to % set.			In relation to No. of nuts set.		
	Mean % set of nuts.	Significance.	Critical difference.	Mean No. of nuts set.	Significance.	Critical difference.
A. 2,4-D 30 p. p. m. + Indole butyric acid 30 p.p.m.	62.29	P 0.05 Significant	10.91	54.8	P 0.05	4.56 nuts.



B. 2, 4-D 30 p.p.m.60.96 + Indole pro- pionic acid 30 p.p.m.	60.96	45.4
C. 2, 4-D. 30 p.p.m. coconut water.	54.30	41.2
D. Control (water spray)	29.48	20.6
Coefficient of variability = 15.2 %		Coefficient of variability = 9.48 %
Conclusions A B C D.		Conclusions A B C D.

Although there was slight reduction in the mean weight and volume of unhusked and husked nut in the case of hormone sprayed bunches compared with the control, no significant differences have however been noted in the relative effects of the different hormone mixtures sprayed on reduction in size and weight of the nut as seen from the data tabulated below:—

*Table showing the mean weight of unhusked  
and husked nut.*

Treatment.	In relation to unhusked nut.			In relation to husked nut.		
	Mean weight in grams.	Signifi- cance.	Critical differ- ence.	Mean weight in grams.	Signifi- cance.	Critical differ- ence.
A. Control (water spray)	908.07	P> 0.05 Signifi- cant	121.66 gms	468.17	P>0.0 Signifi- cant	43.60 gms
B. 2,4-D 30 p. p. m. + coconut water.	625.05	P> 0.05 Signifi- cant.		330.50	P> 0.05 Signifi- cant.	

C. 2,4-D 30

p. p. m. +

I. P. A. 40

p. p. m. 621.85

217.20

D. 2,4-D 30

p. p. m. +

I. B. A. 40

p. p. m. 579.95

299.58

Coefficient of  
variability = 12.91%  
Conclusions A B C D.

Coefficient of  
variability = 8.98%  
Conclusions A B C D.

*Table showing the weight of unhusked and husked nut.*

Treatment.	In relation to unhusked nut.			In relation to husked nut.		
	Mean weight in grams.	Signifi- cance.	Critical differ- ence.	Mean weight in grams.	Signifi- cance.	Critical differ- ence.
A. Control (water spray)	902.47		84.67	473.08		51.86 gms
B. 2,-4D 30 p. p. m. + coconut water.	656.65	P> 0.05 Signifi- cant.		347.41	P> 0.05 Signifi- cant.	
C. 2,4-D 30 p. p. m. + I. p. A. 30	556.11			292.14		
D. 2,4-D.30 p. p. m. + I. B-A. 30	581.42			297.11		
Coefficient of variability = 9.12% Conclusions A B D C.			Coefficient of variability = 10.66 % Conclusions A B D C.			



*Table showing the volume of unhusked and husked nut.*

Treatment.	In relation to unhusked nut.			In relation to husked nut.		
	Mean Vol. in cc's.	Signifi- cance.	Critical differ- ence.	Mean Vol. in cc's.	Signifi- cance.	Critical differ- ence.
A. Control (water spray)	2493.33		301.03	546.83		73.00
B. 2,4 D 30 p. p. m. + coconut water.	1610.25	P>0.05 Signifi- cance.		406.50	P>0.05 Signifi- cance.	
C. 2,4 D 30 p. p. m. + I.P.A. 40 p. p. m.	1641.47			368.00		
D. 2,4-D 30 p.p.m. + I.B.A. 40 p.p.m.	1617.00			349.50		
	Coefficient of variability = 11.87% Conclusions A C D B			Coefficient of variability = 12.68% Conclusions ABCD		

*Table showing the volume of unhusked and husked nut.*

Treatment.	In relation to unhusked nut.			In relation to husked nut.		
	Mean Vol. in c.c's	Signifi- cance.	Critical differ- ence.	Mean Vol. in cc's.	Signifi- cance.	Critical differ- ence.
A. Control (water spray)	2494.33		255.71	531.83		102.09
B. 2,4-D 30 p.p.m. + coconut water	1731.75	P>0.05 Signifi- cant.		399.37	P>0.05 Signifi- cant.	

C. 2, 4-D 30  
 p.p.m. + 1448.74 354.00  
 I. P. A. 30  
 p. p. m.

D. 2, 4-D 30  
 p. p. m. + 1629.49 359.75  
 I. B. A. 30  
 p. p. m.

Coefficient of variability	= 10.61%	Coefficient of variability	18.02%
Conclusions	A B D C	Conclusions	A B D C

In respect of copra per nut, although, nuts from sprayed bunches yielded significantly smaller quantity of copra than that obtained from nuts in the control, no significant differences have, however been observable in the relative effects of the different hormone sprays. With regard to the total quantity of copra per bunch the sprayed bunches recorded significantly larger quantity of copra per bunch than that obtained from control bunches and among the hormone sprays under trial 2, 4 dichlorophenoxy acetic acid 30 p. p. m. mixed with indole butyric acid 30 p. p. m. yielded significantly larger quantity of copra per bunch than that obtained from other combinations as observed from the data presented in the following tables.

*Table showing mean copra per nut and total quantity of copra per bunch.*

Treatment.	In relation to copra per nut.			In relation to copra per bunch.		
	Mean Wt. of copra in grams.	Signifi- cance.	Critical differ- ence.	Mean Wt. of copra in grams.	Signifi- cance.	Critical differ- ence.
A. Control (water spray)	159.15		22.62	3498.0		1163.90 gms.
B. 2,4-D 30 p. p. m. + coconut water.	135.80	P>0.05 Signifi- cant.		5279.8	P>0.05 Signifi- cant.	



C. 2, 4-D 30

p. p. m. + 125.11

5438.7

I. P. A. 40

p. p. m.

D. 2, 4-D 30

p. p. m. + 129.78

4709.2

I. B. A. 40

p. p. m.

Coefficient of  
variability = 11.94%  
Conclusions A B D C

Coefficient of  
variability = 17.85%  
Conclusions C B D A

*Table showing mean copra per nut and total quantity  
of copra per bunch.*

Treatment	In relation to copra per nut			In relation to copra per bunch		
	Mean Wt. of copra in grams	Signifi- cance.	Critical differ- ence	Mean Wt. of copra in grams	Signifi- cance	Critical differ- ence
A.						
Control	172.27		16.27	3339.4		880.95 gms.
B 2, 4-D 30		P > 0.05			P > 0.05	
p. p. m. + coconut	131.96	Signifi- cant		5243.7	Signifi- cant	
C 2, 4-D 30						
p. p. m. +	118.31			5030.5		
I. p. A. 30						
p. p. m.						
D 2, 4-D 30						
p. p. m. +	122.62			6319.4		
I. p. A. 30						
p. p. m.						
	Coefficient of variability = 8.51 Conclusion A B D C			Coefficient of variability = 12.83 Conclusion D B C A		

The test of significance of means applied to the results of all the treatments has shown that there is no significant difference between mean yields of copra per nut irrespective of two strengths *viz.*, 30 p. p. m. and 40 p. p. m. of indole propionic acid and indole butyric acid mixed with 2, 4-dichlorophenoxy acetic acid. It has been observed that the mean total quantity of copra per bunch secured with sprays of mixtures of 40 p. p. m. is significantly greater than that obtained with 30 p.p.m. indole propionic acid mixed with 2, 4 dichlorophenoxy acetic acid. On the other hand mean total quantity of copra per bunch obtained with spray of mixtures of 30 p. p. m. indole butyric acid is significantly greater than that obtained with 40 p. p. m. indole butyric acid mixed with 2, 4-dichlorophenoxy acetic acid. The test of significance of means applied has also shown that sprays of mixtures of 2, 4-dichlorophenoxy acetic acid mixed with 30 p. p. m. indole butyric acid results in securing significantly larger quantity of copra per bunch than that secured with sprays of mixture of 2, 4-dichlorophenoxy acetic acid mixed with indole propionic acid 40 p. p. m. strength.

The results of experiments conducted have thus shown that coconut water used at present in combination with 2, 4-dichlorophenoxy acetic acid against shedding of buttons can easily be substituted by other synthetic hormones like indole propionic acid and indole butyric acid and mixtures of 2, 4-dichlorophenoxy acetic acid 30 p. p. m. with Indole butyric acid 30 p. p. m. has proved significantly superior than that secured with 2, 4-dichlorophenoxy acetic acid mixed with either cocount water or other concentrations of synthetic hormones under trial.

#### 6. *Study of the problem of occurrence of barren nuts.*

As recorded in the two preceding years, the observations made on dissection of barren nuts from forty-three trees showing heavy incidence of barren nuts have shown that the tendency to produce barren nuts is largely restricted to the period of heavy production extending from March to June, while it is low during August-October. The barren nuts with splitting of



shells was very marked in proportion to other types noted. Production of barren nuts with splitting of the shell at the apex have been generally met with during the summer months while those with splitting of shells at the base are confined to the winter season. Barren nut produced during July-October on the other hand did not belong to any particular type recorded. Individual trees have been observed to produce particular type of barren nuts during particular months in successive years which has indicated that the tendency to produce barren nut is an inherent character of the tree.

Observational trials in progress for the last four years to test the effect of emasculation of successive bunches during the year long ahead of receptivity of female flowers in the bunch have once again indicated a general reduction in barren nut production as observed from the following table:—

*Table showing increase or decrease in percentage barren nut production in eight selected trees.*

Year	SELECTED TREES							
	1	2	3	4	5	6	7	8
1954	-3.81	-3.80	-6.67	-12.79	-10.43	-4.71	-3.82	-8.86
1955	-17.71	-1.30	-6.67	-17.89	-4.83	-9.21	-0.12	-5.26
1956	+1.69	-0.60	-6.17	-1.79	+1.57	-11.71	-7.12	-7.46
1957	-9.70	+8.80	-0.17	-4.29	-2.83	-3.09	-10.12	-5.06

Of the eight trees under observation during the year seven trees have shown a reduction in incidence in barren nut production resulting from emasculation of inflorescences. Of these eight trees, five trees showed a reduction in the percentage of barren nuts in all the four years under observation, while the other three trees showed a reduction only in three out of the four year period. This has indicated that production of barren nut among other causes may also, perhaps, be due to some extent an out come of natural self-pollination.

Fortnightly spraying of successive bunches of three selected barren nut producing trees with cows urine was continued to find out the effect of such application on barren nut production. The data collected has shown that the effect of these sprays is very variable and, therefore, not worth continuing and hence discontinued.

Sprays of indole butyric acid in varying concentrations viz. 10, 20, 30 and 40 p. p. m. strength undertaken four times at intervals of a week commencing the sprays immediately after receptivity of the female flowers have failed to show any reduction in incidence of barren nut production. Sprays of indole propionic acid in similar concentrations have been undertaken during the year to test their effects on the production of barren nuts. This has also failed to show any reduction in production of barren nuts.

A small scale observational trial was also initiated during the year to find out effect of application of common salt to trees showing heavy incidence of barren nuts and the results are awaited.

*Floral Biological Study of palms other than the coconut.*

Floral biological studies on four available palms other than the coconut viz. *Cocos plumosa*, *cocos australis* *Cocos schizophylla* and *Caryota urens* were continued and relevant data on various aspects as flowering season, frequency of production of spadices, time taken for splitting of spathes and to reach the stage of receptivity, duration of male and female phases were recorded. These studies were, however, discontinued from January 1958, in accordance with the recommendations of the Special Sub-Committee set up by the Indian Central Coconut Committee to review the work of the Central Coconut Research Station, Kasaragod.

The growth of palmyra seedlings collected locally and from other palmyra growing regions of South India were continued to be recorded. The seedlings of these different varieties of palmyra even after four years after sowing have been observed to be slow having put forth only a mean of leaves per seedling so far. None of the



seedlings under observation have as yet formed a stem even at the end of  $4\frac{1}{2}$  years after sowing.

Among the seeds of other oil-bearing palms from Brazil viz., *Manisaria saccacrifera*, Gaerten, *Oenocarpus batua* and *Scheelea macroleysis*, only the last mentioned species of palm which germinated has been growing satisfactorily. The three seedlings of the last mentioned palm have been transplanted in pots preliminary to planting in permanent plots.

### Programme of Work.

1. Studies on morphology and anatomy of crown to include
  - a) Studies in the development of the crown in the dwarf, hybrid and irregularly bearing palms.
  - b) Developmental morphology of the inflorescence and embryology of the coconut.
2. Developmental morphology and anatomy of the nut to include
  - a) Studies in origin and development of the fibre in the husk.
  - b) Studies in principal tissue changes in the nut from fertilization to maturity.
  - c) Studies in parthenocarpy in the coconut.
3. Cytological study of the different varieties of the coconut including giant forms and those bearing puny nuts.
4. Studies in the coconut pollen with special reference to
  - a) Study in composition of the coconut pollen.
  - b) Study to determine the relative share in the present set of nuts arising due to self, cross pollination through agency of wind and insects.
  - c) Evaluation of the distance to which pollen can disseminate through agency of wind.
5. Studies in shedding of buttons to include
  - a) Trial of new hormones as against shedding of buttons.

- b) Trials to assess the relative effects of hormone spraying with and without manuring and spraying alone without manuring.
  - c) Anatomical aspects of shedding.
  - 6. Studies in barren nut production with special reference to
    - a) Study of fertilization in normal and barren nuts.
    - b) Study of the anatomical aspects of development in normal and barren nuts.
  - 7. Studies in inducing suckering in coconut palms through application of growth promoting substances.
  - 8. Studies in inducing flower initiation in non-bearing palms through application of growth promoting substances.
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### III Agronomy.

#### 1. *Manurial Experiments.*

(1) *N. P. K. manurial experiment.* Manurial requirements of the coconut palm for major nutrients have not been investigated in any great detail though sporadic attempts have been made of and on to study the response of the trees to certain empirical combination of manures. This comprehensive experiment was therefore started in 1953 with the object of determining the response of the palm to the applications in all possible combinations of N, P and K each at three levels with and without green manuring. The three levels at which the nutrients were applied were 0, 0.75 lb. and 1.50 lb. each per tree per year, nitrogen was given in the form of ammonium sulphate, phosphoric acid as superphosphate (ordinary) and potash as muriate of potash. *Crotalaria striata* was the crop selected to raise and incorporate as a green manure crop. A  $3^3 \times 2$  confounded design in 6-plot blocks replicated twice has been adopted as per the suggestions of the Statistical Adviser to the Indian Council of Agricultural Research.

No significant differences in yield among the treatments were observed in 1954. In 1955 and 1956 a definite response to nitrogen was seen; the double dose did



not fare better than the single dose. Studies carried out on the quality of the nut revealed a tendency for the values in general to appreciate with increased doses of potash and to depreciate with increased doses of nitrogen. Phosphoric acid did not appear to have any marked effect on quality.

The experiment was continued and the scheduled quantity of manures was applied in September 1957. Since the growth of *Crotalaria striata* was rather unsatisfactory in the experimental plots green leaf was brought from outside and applied at about 50 lb. per tree. The experimental area was given interculturalations as usual.

Observations on the yield of nuts and female flowers produced were made individually for all the trees under the experiment. The nuts harvested from trees selected at random in the months of January and February 1958 were studied in detail for quality. The incidence of reversible foliar yellowing and leaf-spot disease was also investigated in relation to manuring.

(a) *Yield of nuts*: The yield data for the calendar year 1957 was subjected to a rough statistical analysis using co-variance technique with the pre-treatment yield as the concomitant factor. This step has improved the efficiency of the experiment by 80%. Among the main effects only that due to nitrogen showed significance. Among the two factor interactions only N x G (nitrogen x green manuring) has proved significant.

The yield data in respect of main effects are summarised below.

Main effect	Mean yield of nuts (adjusted) per tree in 1957	Whether differences significant or not	Critical differences (p=0.05)	Conclusions
N <sub>0</sub>	44.3			
N <sub>1</sub>	52.1	Yes;		
N <sub>2</sub>	51.8	P>0.01	3.54 nuts.	N <sub>1</sub> , N <sub>2</sub> , N <sub>0</sub>

P <sub>0</sub>	48.6		
P <sub>1</sub>	52.1	No	
P <sub>2</sub>	47.6	P>0.05	—
K <sub>0</sub>	47.2		
K <sub>1</sub>	50.7	No	
K <sub>2</sub>	50.3	P>0.05	—
G <sub>0</sub>	49.0	No	
G <sub>1</sub>	49.8	P>0.05	—

General mean = 49.42 nuts

Standard error per tree per plot = 7.43 nuts.

Coefficient of variation – 15 per cent.

It is seen that both the single and double doses of nitrogen have given significantly increased yields over “no nitrogen”. There is, however, no marked difference in yields among the two doses adopted. In fact the double doses have given a slightly lower yield than single one. These results are in conformity with those obtained last year.

An indication of possible differential behaviour of nitrogen in the presence and absence of green manure is obtained for the first time, from the significance of the interaction nitrogen x green manuring. The pertinent data are given below.

	Mean yield of nuts per tree		
	N <sub>0</sub>	N <sub>1</sub>	N <sub>2</sub>
G <sub>0</sub>	42.2	52.9	52.0
G <sub>1</sub>	46.5	51.2	51.7

Critical difference for the body of  
the table (P=0.05) 4.97 nuts.

It looks as if green manuring may be able to satisfy at least part of the nitrogen requirements of the crop.

(b) *Quality of the nut.* The results of studies on the quality of nut are summarised below in respect of the main effects only.



Main effect	Mean wt. of nut (gms)		Mean Vol. of nut (C. cm)		Copra content per nut (gm)
	Unhusked	Husked	Unhusked	Husked	
N <sub>0</sub>	916	535	2560	598	185
N <sub>1</sub>	871	475	2431	548	169
N <sub>2</sub>	835	460	2347	541	165
P <sub>0</sub>	858	482	2447	558	174
P <sub>1</sub>	860	486	2403	566	172
P <sub>2</sub>	904	502	2488	563	173
K <sub>0</sub>	851	480	2338	562	171
K <sub>1</sub>	885	499	2448	558	174
K <sub>2</sub>	886	491	2552	567	174

The tendency for the quality of nut to depreciate with increased dosage of nitrogen is seen in almost all the characters studied. In the case of phosphoric acid the effect is in general, not appreciable. Potash has given varying results—some characters appear to be benefited, while others are not.

(c) *Out-turn of copra.* Since copra is the commercially important product of the coconut palm, the effect of manures on the total out-turn of copra per tree was also studied. These figures were worked out by multiplying the average yield per tree by the average copra content per nut. The data are summarised below:—

Main effect.	Copra out-turn per tree (kg)
N <sub>0</sub>	8.43
N <sub>1</sub>	8.73
N <sub>2</sub>	8.43
P <sub>0</sub>	8.45
P <sub>1</sub>	8.95
P <sub>2</sub>	8.19
K <sub>0</sub>	8.04
K <sub>1</sub>	8.82
K <sub>2</sub>	8.73

The differences observed were not statistically significant.

(d) *Incidence of foliar yellowing.* Foliar yellowing in coconut palms is a usual phenomenon observed in certain seasons of the year. To determine whether the intensity of its incidence is in any way influenced by manurial treatments, counts of trees showing foliar yellowing in the N. P. K. experimental plots were taken in September 1957. The data are summarised below for the main effects N, P & K.

Main effect.	Percentage of trees showing foliar yellowing
N <sub>0</sub>	2.6
N <sub>1</sub>	6.6
N <sub>2</sub>	9.2
P <sub>0</sub>	7.2
P <sub>1</sub>	5.3
P <sub>2</sub>	5.9
K <sub>0</sub>	10.2
K <sub>1</sub>	4.0
K <sub>2</sub>	3.8

The effects of only N and K were found to be significant. The incidence of yellowing increased with increase in the dose of nitrogen applied while it decreased with increased dose of potash.

(e) *Incidence of leaf spot.* The Pestalozzia leaf spot is prevalent all over the experimental area and an attempt was made to estimate the extent of its incidence in the different manurial experiment plots by adopting a standardized sampling procedure. The incidence was rather low in one replication and relatively high in the other. In respect of treatments, nitrogen alone showed significant effects; plots which received nitrogen had less of leaf spot disease than "No nitrogen" plots. The data are summarised below:—



Main effects.	Percentage of leaf area affected by the disease.
N <sub>0</sub>	0.63
N <sub>1</sub>	0.48
N <sub>2</sub>	0.40
P <sub>0</sub>	0.58
P <sub>1</sub>	0.47
P <sub>2</sub>	0.46
K <sub>0</sub>	0.47
K <sub>1</sub>	0.47
K <sub>2</sub>	0.56

There was also indication from the data that combination of higher levels of P and K tended to reduce leaf spot incidence markedly.

The experiment will be continued and scheduled observations made and recorded.

(2) *Chilean nitrate experiment.* This observational trial was started in 1953 with the object of determining the relative merits of Chilean nitrate and ammonium sulphate as a source of nitrogen for the coconut palm. It was being claimed that Chilean nitrate is better in that the nitrogen is in the easily available form and that the large quantity of sodium contained in it, in addition to being directly beneficial to the crop, will also to some extent obviate the necessity for potash. Ammonium sulphate and Chilean nitrate were supplied alone and in combination with phosphoric acid and potash. Nitrogen was supplied at 1 lb. per tree, phosphoric acid at 0.5 lb. as superphosphate (ordinary) and potash at 1 lb. as muriate of potash.

In 1954 there was no marked difference between Chilean nitrate and ammonium sulphate. In 1955 and 1956 the yields were more in favour of Chilean nitrate than ammonium sulphate.

The experiment was continued. The scheduled

doses of manures were applied in August 1957. The yield data for 1957 are summarised below:—

*Mean yield of nuts per tree.*

Chilean nitrate	70.7
Ammonium sulphate	63.4

The results are in conformity with the observations made in previous years to the effect that Chilean nitrate is better than ammonium sulphate as a source of nitrogen to the coconut palm. Trees which were receiving only phosphoric acid and potash without nitrogen have begun to show yellowing of foliage and lower yields.

The experiment is proposed to be continued for two more years in the present form.

*Trial of nitrogenous fertilisers.* This trial was started in 1956 with the object of comparing the relative merits of different nitrogenous fertilisers such as ammonium sulphate, ammonium sulphate nitrate, ammonium chloride, calcium ammonium nitrate, calcium cyanamide and groundnut cake for application to the coconut palm. The nitrogenous manures were to be applied at rates sufficient to give 1.0 lb. nitrogen per palm. Phosphoric acid and potash were to be applied as basal dressing at 0.5 lb. and 1.0 lb. per tree respectively as superphosphate (ordinary) and muriate of potash. A 9 x 6 completely randomised block design with single-tree plots has been adopted.

The yield data for 1956 did not show significant differences among treatments. This was only to be expected as in coconut experience has shown that two to three years are normally required for the effects to be reflected in yields.

The experiment was continued as scheduled. Manures were applied in the month of September 1957. The yield data for 1957 were analysed both as they were and by co-variance taking the pre-treatment yield as concomitant factor. The data are summarised below:—



Treatment	Mean yield of nuts per tree in 1957.	
	Unadjusted	Adjusted
Ammonium sulphate+P+K	54.3	58.0
Ammonium sulphate nitrate + P+K	60.8	58.5
Ammonium chloride+P+K	56.8	51.5
Calcium cyanamide + P + K	42.7	47.5
Urea + P + K	58.7	54.0
Calcium ammonium nitrate + P+K	38.0	43.1
Groundnut cake + P+K	59.0	55.7
P + K	43.8	45.0
No manure	62.8	63.6
General mean	53.0	53.0
Whether treatment differ- ) ences significant or not ) (P=0.05) )	No.	No.
Standard error per plot	25.0	18.9
Coefficient of variation percent	47.2	35.6

There are no significant differences among the different treatments. The coefficient of variation is rather high even after adjustment of yields based on pre-treatment data. Co-variance analysis has increased the precision of treatment comparisons by 74%.

Since the fertilisers used are known to vary in their influence on soil reaction, soil samples were drawn from the manure basins and estimated for pH to get an idea of the trend of change. The results are summarised below.

	pH at different depths of the soil.		
	0"-12"	12"-24"	24"-36"
Ammonium sulphate	5.3	5.0	5.0
Ammonium sulphate nitrate	5.6	5.6	5.5
Ammonium chloride	5.7	5.3	5.5
Calcium cyanamide	6.0	5.5	5.5
Calcium ammonium nitrate	5.7	6.0	5.6
Urea	5.6	5.3	5.5
Groundnut cake	5.2	5.0	5.0
Control (no manure)	5.6	5.6	5.5

A rising trend of pH in the case of calcium cyanamide and a falling trend in the case of ammonium sulphate and groundnut cake is discerned.

The experiment will be continued and scheduled observations made and recorded.

(4) *Irrigation-cum-manuring experiment.* Coconut palms have been found to respond to irrigation during summer months. A small scale trial was, therefore, initiated in 1956, with the aim of studying the combined effect of irrigation and manuring. The annual dose of manure scheduled for application is 1.0 lb. of nitrogen as ammonium sulphate, 0.5 lb. of phosphoric acid as super phosphate (ordinary) and 1.0 lb. of  $K_2O$  as muriate of potash. It is to be applied in one dose either in the usual manuring season viz., August–September or in April with irrigation and also in split halves, one half being given in August–September and the other in April with irrigation. Irrigation was done by pot watering with 10 gallons of water twice a week commencing from the cessation of North East monsoon rains and terminating with the outbreak of South West monsoon rains. The layout adopted was 6 x 5 randomised and replicated block design with single tree plots.

The yield data of 1956 did not reveal any significant difference among the different treatments. This was only to be expected as in coconut, it takes about 2 to 3 years for the effect, if any, to be reflected in yields.

The experiment was continued as scheduled. The results of analysis of yield data of 1957 are summarised below:—

Treatment	Mean yield of nuts in 1957.	
	Unadjusted	Adjusted.
Manuring with full dose in August–September.	40.8	44.8
Manuring with $\frac{1}{2}$ dose in August–September and other half in April with irrigation.	48.8	51.5
Manuring with full dose in April with irrigation.	55.0	43.3



Manuring with full dose in August-September and irrigation in summer.	56.2	49.0
Irrigation alone in summer.	44.2	53.3
No manuring or irrigation.	37.2	40.3
General Mean.	47.0	47.0
<hr/>		
Whether treatment differences significant or not ( $P=0.05$ )	No	No
Standard error per plot	20.20	12.89
Coefficient of variation	43.0%	27.4%

There are no significant differences among the treatments either before or after adjustment. However, by using co-variance technique it has been possible to increase the precision of treatment comparisons by 132.3 per cent.

The experiment will be continued as scheduled and observations made and recorded.

(5) *Method of application of fertilisers.* This experiment was started during the year under report for comparing the relative effects of applying fertilisers to the coconut palm in different ways. The methods under comparison are broadcasting and covering by ploughing, applications in basins dug round the base of the palm and application in mamatty holes taken round the base of the trees. Since the disturbance of the soil itself has some effect, each placement method is being tried without fertiliser as well as with. The design of layout adopted was 7 x 4 randomised and replicated one. The manure to be applied to the coconut palms consists 1.0 lb. of nitrogen as ammonium sulphate, 0.5 lb. of phosphoric acid as superphosphate (ordinary) and 1.0 lb. of potash as muriate of potash per tree per year.

The scheduled doses of manures were applied in October 1957. The yield data summarised below did not reveal any significant difference among treatments. This is only to be expected as it is too early to get response.

Treatment	Mean yield of nuts per tree in 1957	
	Unadjusted	Adjusted
Broadcasting and ploughing	43.1	55.2
Ploughing alone	58.9	54.2
Application in basins	52.8	52.4
Basins alone	54.3	52.5
Application in mammatty holes	57.7	53.7
Mammatty holes alone	55.0	55.8
Control	55.8	55.8
General mean	68.5	66.3
Whether treatment differences significant or not ( $P=0.05$ )	No.	No.
Standard error per plot	12.24	7.67
Coefficient of variation (%)	23.8	13.8

Co-variance analysis has improved the precision of treatment comparisons by 136.5 per cent.

The experiment will be continued as scheduled.

## 2. Cultural experiments.

- (1) *Effect of "cultivation and manuring" Vs "cultivation alone without manuring" and "no cultivation and no manuring".*

In this Research Station there are three permanent observation plots receiving differential treatments for more than twenty years now. These have been established to study the long term trends in the performance of coconut palms in bearing under complete neglect, regular cultivation alone without manuring or regular cultivation and manuring. The regularly cultivated and manured plot received every year two or three ploughings with iron plough and one or two hoeings with junior hoe and the palms were manured with 3 lb. of ammonium sulphate, 2 lb. of superphosphate (ordinary) and 2 lb. of muriate of potash and 50-100 lb. of green leaves. The regularly cultivated plot received cultivation alone without manuring. The "no cultivation and no manuring" plot continued to be under neglect right through.



Regular cultivation and manuring had resulted in a marked increase in the yield of nuts and is helping to maintain the yield at a high level, when compared to the completely neglected plot. Another important factor observed was that regular cultivation by itself was effective in increasing yields.

Scheduled observations were continued on the trees in the three observational plots. The data of yield, female flower production and setting percentage and the economics of the treatments are discussed below.

(a) *Yield.* The mean yield of nuts obtained per tree under the three treatments are given below:—

Regularly cultivated and manured	= 44.4+3.94
Regularly cultivated but not manured	= 33.1+2.26
Not cultivated or manured	= 18.1+2.82

Highest yield has been obtained under regular cultivation and manuring and the lowest under continued neglect. Regularly cultivated plot has also given definitely more yield than the uncultivated and unmanured plot, but has not come up to the standard of the regularly cultivated and manured plot. This is in general conformity with the findings of the previous years.

(b) *Female flower production and setting percentage.* It was considered worthwhile to investigate how the increased yield observed as a result of cultivation and manuring has been brought about, whether it is due to increased production of female flowers, to increased setting or both. The relevant results are summarised below.

	Mean no. of female flowers produced.	Mean setting percentage.
Regularly cultivated and manured	134.2+11.55	41.8+2.95
Regularly cultivated, but not manured	101.3 + 9.52	33.9 + 2.15
Not cultivated or manured	72.0 + 10.24	33.5+4.38

It is seen that the difference in yields observed is to be ascribed mostly to the increased number of female

flowers produced, though there is indication from the data that manuring may have some favourable effect on the percentage of setting also.

(c) *Economics.* Since profitableness is the only incentive which will make the growers adopt any improved practice, the economic implications of this year's results were worked out on the basis of existing rates. The results are summarised below:—

Item of costing (per tree)	Regularly cultivated and manured		Regularly cultivated		Not cultivated or manured	
	Rs.	nP.	Rs.	nP.	Rs.	nP.
Intercultivation	0	25	0	25	Nil	
Manures and manuring	1	75	nil		nil	
Harvest and other miscellaneous items	0	30	0	25	0	20
Total cost of cultivation	2	30	0	50	0	20
Value of nuts produced	8	88	6	62	3	62
Net profit	6	58	6	12	3	42
Increased profit over no cultivation	3	16	2	70		

It is very clear that regular cultivation and manuring have been able to show very substantial additional profits which works out to as much as Rs. 150 to Rs. 190 per acre of 60 trees. The return on the capital invested in cultivation and manuring is indeed very high.

The three observation plots will be continued to be maintained as heretofore on a permanent basis to serve as ocular demonstration of the improvement that can be effected on coconut palms by systematic cultivation and manuring. Observations on yield and other characters of the palm will be made and recorded.

(2) *Trial of intercultural practices.* This trial was started in 1952 with the object of determining the most effective and economic cultural practices to be adopted for loamy soil, as the logical outcome of the previous findings that intercultivation by itself is able to increase



the yield considerably under the conditions obtaining on the West Coast. The intercultural practices under comparison are:

(1) ploughing twice in August-September and November-December; (2) digging once in August-September; (3) piling mounds and levelling; (4) digging basins and covering and (5) control (no cultivation). No manuring is being given to the experimental trees. A 5 x 4 randomised and replicated block design has been adopted.

The experiment did not give significant results in any of the years but "piling of mounds" gave consistently high yields in all the years showing thereby that it is better than the other intercultural treatments under trial. The apparent clue to this was provided by the results of moisture estimations done in the experimental area. It was observed that the percentage of moisture both in the first and second foot layers was more in the plots under "piling of mounds" treatment than under others. Among the different intercultural practices, ploughing was found to be the least expensive.

The trial was continued. The various cultural treatments were given at the appropriate periods. The yield data were gathered and moisture estimations done to study the influence of the different treatments.

(a) *Yield*. The results of analysis of the yield data of 1957 are summarised below.

Treatment	Mean yield of nuts per tree in 1957.
Ploughing twice with iron plough	37.9
Digging with mammatty once	42.3
Piling mounds and levelling	43.3
Forming basins and covering	38.2
Control	40.1
General mean	40.4
Whether treatment differences significant	No; $P > 0.05$
Standard error per tree per plot	5.36 nuts
Coefficient of variation (%)	13.3 nuts

As in previous years "piling of mounds" has registered the highest yield, though the treatment differences on the whole are not significantly different.

(b) *Moisture content.* The studies done during the year were more to see whether the differences in moisture content observed at the peak of summer in previous years among the different cultural treatments reflect the position in the other seasons also. During the year the moisture status of the soils in relation to inter-cultural practice was investigated at the height of South West Monsoon and also towards the termination of the North East Monsoon. No consistent differences in favour of any treatment was seen.

An attempt was made just before the mounds of the "piling mounds and levelling" treatment were levelled up in November 1957 to estimate the moisture content of the soil under the mounds and in the area in between the mounds. There is indication to show that mounds have been able to preserve more moisture in the first foot layer as can be seen from the data summarised below:

	Moisture percent at different depths		
	0-12"	12-24"	24-36"
Under the mounds	8.6	10.1	10.4
In between mounds	7.3	10.0	10.4

(c) *Cost of operation.* As in previous years the labour actually required for the different intercultural treatment was worked out and also the cost per acre. The data are furnished below.

Treatment	Units of labour required. (per acre)	Cost per acre.	
		Rs.	nP.
Ploughing twice with iron plough	17 pair hours	10.20	
Digging once	60 man hours	12.00	
Piling mounds and levelling	107 „ „	21.40	
Forming basins and covering	71 „ „	14.20	

Ploughing is the least expensive of the intercultural practices.



This trial is proposed to be continued in the present form for one more year.

3. *Yield studies.* Records of yield and flowering notes obtained at every harvest were continued to be maintained for each and every tree of about 6000 trees on the station. During 1957 the total yield worked out to 2,70,584 as against the record yield of 3,10,250 nuts obtained during 1956.

Analysis of the monthly yield records showed that the month of May had the highest share of the total of yield of the year, viz; 13.2 per cent.

4. *Nursery studies.*

(1) *1957 nursery.* Large scale production of quality seedlings of the West Coast tall variety is an important work of the Station. For this seednuts from the outstanding mother palms of the Station were gathered during the months of February to May and planted in the nursery with the outbreak of the monsoon in June. Observation on the germination of seednuts was regularly made and recorded. During the year the overall germination worked out to 90 per cent.

(2) *Age of seednuts and occurrence of non-germination and dead sprouts.*

In some coconut nurseries, seednuts are reported to remain ungerminated and young sprouts to die, in large numbers for no apparent reason. There was some suspicion that these may be due in part to the fact that the seednuts are not fully ripe at the time of harvest. In order to verify this view, a preliminary experiment was done during the year under report. Seednuts of approximately 12, 11, 10 and 9 months of age were sown in the nursery and particulars of ungerminated nuts and dead sprouts were gathered. The following results were obtained.

Age of seednut	Ungerminated nuts (%)	Dead sprouts (%)
12 months	4	15
11     ,,	26	16
10     ,,	22	18
9       ,,	62	42

There is indication that immaturity of nuts can result in large scale non-germination of nuts and death of sprouts in the nursery. Dissection studies showed that in the ungerminated nuts of 9 months age group, the kernel and the embryo had completely got rotted or the embryo had not become active. In the other age groups, many nuts had germinated but the sprout had dried up before they could emerge out of the husk. Thus it is seen that the embryo of immature nuts might not have had sufficient growth and that even if it gives rise to a sprout, the sprout may be weak and liable easily to succumb to unfavourable conditions.

The above studies are proposed to be continued in more detail during next year.

(3) *Establishment of seedlings in relation to the interval between removal from the nursery and transplanting in the field.*

The object of this investigation is to determine the period for which seedlings pulled out from the nursery can be kept without impairing its ability to establish on transplantation in the field. This information is important when seedlings are consigned to parties in the different parts of the country. The trial laid out for the first time last year had shown that the seedlings could be kept even for as long as 28 days without damage.

The trial was repeated during the year with a slightly modified procedure. As establishment is to a large extent influenced by the weather conditions prevailing at and after transplantation, the experiment was so planned that all the seedlings were planted out on the same day in July 1957. As in last year the seedlings were pulled out and kept packed for periods varying from 7 days to 28 days.

Observations were regularly made for signs of establishment viz., regular production of new leaves. In two to three months time all the seedlings had established well showing thereby that even the long interval of 28 days did not adversely affect the capacity of the seedlings to establish. As in last year the climatic conditions were quite favourable during the period of the trial,



As concordant results were obtained in both the years the study will be discontinued.

(4) *Use of mud pots to provide moisture for newly planted seedlings.*

Newly planted seedlings have to be pot watered during summer and rainless periods for the first two or three years after transplanting to facilitate establishment and good growth. This is particularly necessary in sandy soils subject to severe drought. The feasibility of placing porous mud pots filled with water periodically beside the seedling as a continuous source of moisture was tested during 1958 summer.

Mud pots specially got prepared for this purpose were kept near the seedling, one pot each in one set, two pots in another set and three pots in a third set of treatment. Each of these had a separate control which was watered with the same quantity of water as contained in the pot at the time when the pots were replenished with water. Each pot had a capacity of 7 litres and had to be replenished every week.

The experiment was commenced in summer with seedlings newly planted in sandy soil subject to considerable heating. The seedlings provided as control without any watering got completely dried up in about a month. The mud pots used were found to provide a steady supply of moisture to the soil. When the seedlings were provided with three pots moisture was seen to have spread over an area of about  $1\frac{1}{2}'$  in diameter round the seedlings and to have penetrated to a depth of about 3' and the seedlings remained in good condition throughout the period of the experiment. Two pots or one pot per seedling could supply moisture only to a part of the area round the seedlings and did not appear to be quite adequate. Where water was poured directly round the seedlings the moisture was found to be lost quickly with the result that the seedlings showed signs of wilting.

It is proposed to repeat the experiment in more detail in the coming season.

5. *Intercropping in coconut plantations.* The progress of the pepper vines trained on coconut palms and

also on *erythrina* supports raised in between the palms continued. The growth in general is not satisfactory. The vines are not able satisfactorily to climb on to the stem of the coconut palms and roll down with slight disturbance.

Attempt to raise paddy in the coconut gardens was initiated during the period under report. Two dry paddy strains PTB 29 and 30 obtained from the Agricultural Research Station, Pattambi were sown each in an area of 50 cents. Germination has not been very satisfactory. Observations are in progress.

6. *Irrigation with sea water and fresh water.* This trial was first initiated in 1951 with the object of investigating the possibility of utilising in summer sea water for watering palms growing in littoral sandy soils adjoining the sea. The palms growing in such soils are found to suffer considerably from drought during summer and there is difficulty in getting fresh water for irrigation then. One set of trees growing in the Beach Block of the station was pot watered with sea water, a second set with fresh water and a third set was left as control, without any watering. Watering was done twice a week during summer months.

Though watering improved the general appearance of the trees and increased the number of the functioning leaves in the crown in the earlier years after commencement of watering definite increase in yield was recorded only in 1955. There was absolutely no evidence of any bad effects on the palm consequent on watering with sea water. In 1956 also the same trend was observed. The increased yield was seen to be mainly due to the increased production of female flowers.

The trial was continued. The yield data of 1957 are summarised below.

<i>Mean yield of nuts per tree</i>	
Irrigated with sea water	43
Irrigated with fresh water	50
Control (no watering)	31



Watered trees irrespective of the type of water used have given better yield than the control trees. The watered trees in general had also two more functioning leaves in the crown than the non-watered trees.

The effect of watering on the production of female flowers and setting percentage in different seasons of the year was also studied. The results showed that larger yields were due to the larger production of female flowers and not due to any enhanced setting percentage. These observations are in general conformity with those made last year.

The trial will be continued.

7. *Studies on green manure crops.* Observations were continued on *Calopogonium mucunoides*, *Indigofera hirsuita* and *Crotalaria goreensis* and *Glyricidia maculata*.

*Calopogonium mucunoides.* As in previous years very good crop grew out of self-sown seeds. In order to study its capacity for regeneration after pruning, the plants in a portion of the area were pruned flush with the ground and also 2 to 3" above ground in August 1957. In the former case the out-turn of green stuff worked out to 14,000 lbs. per acre and in the latter 10,000 lbs. The crop completely dried out from the pruned areas, showing that the crop may not be able to stand drastic pruning. This might have also been due to the absence of rains for some time subsequent to pruning. When rain was received subsequently large scale germination of self-sown seeds was seen indicating that there are still reserve seeds in the soil. These plants, however, did not reach the flowering stage before drying up.

To study the annual extension growth of *Calopogonium* a portion of the established crop had been left without incorporation a couple of years back. Observations made so far go to show that the new ground covered by the growth of the vines is only small. Larger coverage come mainly from the plants that grow out of the seeds which get scattered when mature pods burst and dehisce seeds.

Steps have been taken to bring more area under the crop so that detailed management studies can be taken up.

The growth of *Indigofera hirsuta* and *Crotalaria goreensis* was not quite satisfactory when introduced into the garden proper. Both gave about 10,000 lb. of green stuff per acre. Only very poor crops were obtained from self-sown seeds in the garden.

Cuttings and seedlings of *Glyricidia* planted in the different parts of the Research Station in previous years are coming up well. During the year under report more numbers of plants have been planted along the borders of fields, foot paths, roads etc;

8. *Studies on the effect of lime on soil reaction and yield of the Coconut Palms.*

An observational trial to study the effect of application of lime to the coconut palm on soil reaction and yield was started in 1956 with the following four treatment:- (1) Lime alone; (2) lime and manure; (3) manure alone and (4) control (no manure or lime). Lime was applied as slaked lime at 12 lb. CaO per tree in limited area round the base of the trees before the commencement of the regular monsoon rains. Manure applied consisted of 1.0 lb. nitrogen as ammonium sulphate, 0.5 lb. of phosphoric acid as superphosphate (ordinary); and 1.0 lb. of potash as muriate of potash per tree per year.

Lime was applied for the first time in April 1957. Estimation of pH before the application of lime showed it to be 5.5 to 5.6 at different depths. In a subsequent estimation of soil reaction done after a period of two months after lime application during which 24.5" of rain had been received an increase in pH of limed plots by about 0.5 unit in the first 6" layer of soil was seen.

Soil samples were drawn thrice during the year, one before the application of manure and the other two subsequent to manuring. The results are summarised below.





## 9. *Crop weather studies.*

(1) *Meteorological observations.* In order to study the effect of weather factors on the coconut crop a record of the weather factors is being kept at this Station with the help of meteorological instruments installed at the observatory. The data are summarised in tables 1 & 2 of Appendix. The salient features were the following.

(i) *Rainfall.* The total rainfall for the year (4-6-57 to 3-6-1958) amounted to 3139.2 mm. on 109 rainy days as against 3483.4 mm. on 126 rainy days of last year and the 20 year average of 3508.8 mm. on 116 rainy days. The South West monsoon started early and was active in the months of June and July and slackened somewhat in August. The quantity received during the period was about normal. The North East monsoon was comparatively weak as only 211.2 mm. of rain was received as against the normal rainfall of 379.7 mm. Hot weather rains were also deficient of the normal by about 220.9 mm. Drought conditions prevailed from early in November to the end of April.

(ii) *Temperature.* The highest maximum temperature recorded during the year was 35.7°C in the month of December 1957 while the lowest minimum of 18°C was recorded in January 1958. The monthly mean daily maximum ranged from 34.2°C (April 1958) to 28.8°C (July 1957). Monthly mean daily minimum temperature ranged from 25.9°C (May 1958) to 21.3°C (January 1958).

(iii) *Humidity.* During the year cent per cent humidity was recorded on many days in the rainy months of July, August & September and November 1957 and May, June 1958. The lowest percentage of humidity (67%) was recorded in the month of December. The monthly mean daily humidity ranged from 84% in April 1958 to 95% in July & August 1957.

(iv) *Wind velocity.* Wind velocity recorded at 10' from ground level was the highest in May 1958 (6.00 km. per hour) and lowest (0.58 km. per hour) in July 1957. Monthly mean wind velocity ranged from 1.94 km. per hour in August 1957 to 3.51 km. per hour in February 1957.



(v) *Sunshine*. Maximum number of hours of bright sunshine on a day was 11.12 in May 1958. In the months of July and August 1957 and June 1958 there were many days on which there was practically no bright sunshine. The highest number of hours observed was 9.32 in January 1958 and the lowest number (2.67 hours) in July 1957.

(vi) *Evaporation*. The evaporation power of the air as measured by Piche evaporimeter was observed to be the highest (6.4 mm.) in December '57 and lowest (0.00) in July '57. The monthly mean varied from 1.0 mm. in August '57 to 4.2 mm. in December '57 and April '58.

(2) *Crop weather studies*. The young palms of the tall and dwarf varieties planted in a plot adjacent to the observatory was continued to be observed for leaf production, number of leaflets, length of leaflet bearing portion etc. As observed last year dwarf variety has produced more number of leaves than the tall variety during the same period.

Detailed observations on the production phase of the coconut palm confirmed the observations made last year that the nuts harvested in summer months were in general bigger in size and contained more copra than the nuts harvested in the other months of the year. Observations on this aspect will be discontinued.

Since the previous study has shown conclusively that there are marked differences in the development of buttons produced in the different months of the year, a preliminary study has been commenced to trace the development of buttons produced in the different months of the year to the ripe stage. Observations are in progress.

#### 10. *Miscellaneous*.

(1) *Transplanting adult coconut palms*. With a view to studying the effect of transplanting adult bearing coconut palms on their establishment and subsequent performance, two trees had been transplanted in 1953.

There was considerable set back in growth after transplantation. It took 6 to 9 months for them to get established but even afterwards the growth was very slow. The leaves were short and produced at long intervals. The first inflorescence was produced 20 months after transplanting but it had no female flowers. The inflorescences produced subsequently had also only a small number of female flowers.

Observations were continued on the transplanted palms. There was marked improvements during the year. Inflorescences are being produced at quicker intervals and are having larger numbers of female flowers.

Observations will be continued.

(2) *Root pruning to induce bearing.*

In coconut gardens some of the palms though they appear quite normal in growth and outward appearance are not found to produce inflorescences even after many years. The object of this investigation is to find out the response of such palms to severe root pruning.

Two non-yielding palms were given a severe root pruning in 1953 by digging deep trenches all round the base of the palms. Manure was applied in these trenches and then closed. Both of them produced inflorescences about 14 months after root pruning. In order to verify the findings three more non-bearers were given the treatment.

Observations were continued on the treated trees. The palms continued to produce inflorescences regularly during the year. The trees will be continued to be observed.

(3) *Establishment and growth in relation to planting hole.*

It was often observed that seedlings planted in the same site where previously a palm existed make slow and stunted growth compared to seedlings planted in a fresh site. It was thought worth while to try whether some simple treatment such as charring the pits prior to planting will invigorate the growth of seedlings.



Seedlings exhibiting uniform growth characteristics had been planted in 1954 in old and new pits with and without charring. Observation on the vigour of seedlings showed that charring had improved the growth of seedlings, fresh pits responding more to the treatment than old pits.

The seedlings were continued to be studied for vegetative characters relating to growth. The previous observations were confirmed.

(4) *Prevention of driage of husked nuts on storage.*

Coconuts particularly in completely husked condition are prone to get dried up quickly on storage and become unfit for use specially for culinary purposes. The object of this investigation was to find out whether giving a thin coating of paraffin to the husked nut will prolong their keeping quality.

The progressive losses in weight and driage of nuts given the following treatments in April '57 were noted.

Paraffin coating all over the nut.

Paraffin coating only at the eye end.

Paraffin coating all over excepting the eye and

Control (non paraffined).

Nuts given coating at the eye end only and under control treatments got dried up within a period of 8 weeks of storage.

Observations were continued on the experimental nuts. Nuts which were given paraffin coating all over excepting the eye end remained without driage for 28 weeks while those which were given paraffin coating all over remained without driage for as long as 34 weeks. Thus it is seen that paraffin coating is able to prolong the period of storage of unhusked nut very appreciably.

The study will be elaborated and continued.

### Programme of work for 1958-59

1. *Manurial experiments.*

- (i) NPK manurial experiment.
- (ii) Trial of nitrogenous fertilisers.
- (iii) Manuring-cum-irrigation experiment.

- (iv) Method of application of manures.
- (v) Manurial experiment on seedlings in sandy soil.

## 2. *Cultural experiments.*

- (1) Study of the effect of neglect on coconut palms.
- (2) Trial of different cultural practices.
- (3) Yield studies.
- (4) Nursery studies.
- (5) Inter-cropping in coconut plantations.
- (6) Irrigation with sea water and fresh water.
- (7) Observations on green manure crops.
- (8) Studies on the effect of lime on soil reaction and yield.
- (9) Crop weather observations.
- (10) Miscellaneous.

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## IV Chemistry.

### 1. *Soil studies.*

- (a) *Soil Survey of the Central Coconut Research Station, Kasaragod.*

This work was initiated in 1951–1952 and was meant to provide the necessary data on the soils of this Research Station for preparing an accurate soil map showing the different soil types, the soil characteristics, their potential agricultural value and their inter-relationships. Since this Research Station has all the different representative coconut soil types (except the alluvial and the reclaimed soils) found in the West Coast belt of South India which is the main abode of the coconut palms in India, the results of this survey may be expected to serve to guide coconut cultivation in the whole area. A brief note on the soil data collected up to the end of last year was given in the annual report of that year. Fifty further soil samples were analysed during the current year also completing some samples, which had only been partially finished earlier. The remaining samples are being examined and the results tabulated. The results obtained during the year also serve to confirm the conclusions drawn earlier and stated in the report for 1957.



(b) *Soil survey of the coconut growing tracts.* Under the Second Five Year-Plan development programme of this Station a scheme for soil survey of the coconut growing tracts has been sanctioned. Details of this scheme were drawn up and got scrutinised and approved by the Chief Soil Survey Officer, Indian Agricultural Research Institute, New Delhi. Although the Soil Survey Officer appointed in this Scheme joined in March he left in April, and the post has not yet been filled up. However a start has been made in the coconut areas in the Cannanore District on the West Coast; this area being in the main coconut belt of India. Thirtytwo soil samples from fourteen sites from representative coconut groves in the Kasaragod Taluq have been collected for analysis. The examination of these will commence as soon as the Soil Survey Officer joins the duty.

2. *Studies on the influence of common salt on coconut soils.*

Two main beneficial attributes made to common salt regarding its role in coconut soils are (1) it serves to help moisture conservation in the soil and (2) that it is able to release readily available potash from the soils. The former aspect has been under study for the past three years and was continued as in previous years in plots which had received an annual application in one dose of 600 lb. and 900 lb. of NaCl and 765 lb. of KCl per acre in each of the different soil types of red loam, sand and gravelly laterite. No marked effect of salt application on moisture conservation was noted during the period under study. There were, however, clear indications of the differences in the mean moisture content between soil types and between different depths of sampling. At comparable periods gravelly laterite soils had, in general, the highest moisture percentage, sandy soil, the least, and loamy soil occupying a middle position. The moisture content steadily increased with depth in all the soils under study, control as well as salt applied. In order to test the second aspect a round of twenty eight soil samples (in duplicate) have been collected from the plots and the pH, available potash

and exchangeable bases are being determined and the results tabulated.

A pot experiment to study the position of the possible release of available potash by the added common salt is being set up.

### 3. *Studies in plant material.*

#### (a) *Nutritional aspect of barren nut incidence.*

With a view to throw light on the possible cause of the incidence of barren nuts in the coconut palm it was decided to examine whether nutrient deficiencies or excess could be responsible for their production. Several specially selected samples of good and barren nuts were chemically analysed to obtain comparative data on their nutrient contents. The analysis of data so far available has shown that the barren nuts, have nearly two and a half times the moisture content of good nuts one and half times of  $P_2O_5$  over three times of  $K_2O$  and twice magnesium. So also the nitrogen content of barren nuts is higher than the good nuts. This shows that there is an accumulation of most of the major nutrient factors in the barren nuts and that the faulty metabolism is evidently not due to a deficiency condition of these elements. Further work to elucidate the conditions of formation of barren nuts is in progress, specially an examination of the comparative carbohydrate and amino acid contents of the kernels of good as well as barren nuts. Typical analytical data on the comparative studies of good and barren nuts collected during the year under report are given in Table 3.

#### (b) *Nutritional aspects of foliar yellowing in the Coconut Palm.*

The trees under this study received their fifth annual application of complete fertilisers (containing both macro and micro nutrients). There was general improvement noticeable in the conditions of the leaves as noticed last year as well as the slight ameliorative effects noticed in the case of molybdenum and Boron. The statistical analysis of the data on the number of green and yellow leaves show that there has been a



significant variation among different treatments when the number of yellow leaves are taken as the fraction of total number of leaves. Also when the total number of leaves is considered there is a significant variation among the treatments. All these aspects are in conformity with the results reported during the previous year. This study is being continued. Table 4 gives the summary of results of analysis of the observations under this study. The figures for the previous year have also been indicated in the table. It may be seen that molybdenum to a large extent and Boron to some extent do ameliorate the foliar yellowing condition when these are supplemented to the normal N. P. K. additions to the soil under these trees.

(c) *Studies on the chemical composition of nuts during the different stages of development.*

A knowledge about the chemical composition of the coconut from the button stage upto the mature nut stage may enable to throw light on the bio-synthesis of the different products such as the fibre, the oil, sugars, proteins etc. With a view to collect data on these aspects, a systematic chemical analysis of the nut from the initial stages of formation to maturity has been taken up. To begin with, a systematic examination of the different constituents in five nuts in different stages of development has been completed. The study is in progress. Several of the variable characters such as weight, volume, water content, qualities of the water, chemical composition of the husk matter, shell, kernel etc. as well as variation in total sugars and reducing sugars will be studied and recorded.

4. *Studies on the visual nutrient deficiency symptoms in coconut seedlings.*

This study was commenced to ascertain the possible visual symptoms caused under controlled soil deficiency conditions of N.P.K. on coconut seedlings grown in sand cultures. Good deal of difficulty was experienced in getting the seedlings established in the sand-cum-granite jelly medium in pots. N. P. K. in single and in combination doses were given to the seedlings at two levels.

The dosages were fixed by making 1/20th and 1/10th of the normal doses usually given to adult trees which show foliar yellowing *viz.*, 0.5 lb. N; 0.5 lb.  $P_2O_5$  and 0.75 lb.  $K_2O$ . The following are the treatments:—

- I Control – No treatments.
- II
  - a) N – 0.025 lb. N (as 56 gms of ammonium sulphate or equivalent quantity of ammonium nitrate)
  - b) P – 0.025 lb.  $P_2O_5$  (as 57 gms  $Na_2HPO_4$ )
  - c) K – 0.0315 lb.  $K_2O$  (as 18.7 gms of KCl)
  - d) NP – (a + b)
  - e) NK – (a + c)
  - f) PK – (b + c) – as 21.8 gms of  $KH_2PO_4$  + 13 gms KCl
  - g) NPK – (a + f)
- III. Seven treatments having double the doses of nutrients as in II.

There are five replications in each treatment. The nutrients were added in the form of weak aqueous solutions, the concentrations of which were adjusted in such a way as not to cause damage to the roots of the seedlings by salt concentrations. Applications of the nutrient solutions were started in early March and continued till late May when the monsoon set in. Regular monthly observations on the general appearance, height, collar, girth and number of functioning leaves of the seedlings were taken on the seventy-five seedlings under this experiment and recorded. The seedlings also received their prescribed nutrient dosages twice every week. This is the second year of the experiment. Leaf tissues from the seedlings under the different treatments were collected, sampled and analysed for the N, P, K, Ca, and Mg factors. The visual symptom so far observed is only the persistent yellow colour of the foliage in all the seedlings which have not received nitrogen. The experiment is being continued. The leaf analysis results are presented in Tables 5 A (pretreatment sample) and 5 B (post treatment samples).

A comparison of the leaf analysis figures for major nutrients of the leaf samples taken from the seedlings growing under the different treatments leads to the following general conclusions:—



(i) *When only a single nutrient is supplied.* The percentage of nitrogen in the leaf increased when nitrogen was supplied, but the increase was not in proportion to the quantity applied. In the case of phosphorus there was only a small increase in the percentage content in the leaf and that too only when the double dose was applied. Potash applications caused very great increase in the potash content of the leaf, double dose did not give much better than the single dose in this respect.

(ii) *When nutrients were applied two by two.* When nitrogen and potash were applied together, the nitrogen content did not show any great increase, but phosphorus content, did, when compared to the uptake observed when the nutrients were applied alone.

When nitrogen and potash were applied together, the percentages of both tended to decrease.

With potash and phosphorus together also a tendency towards a reduction in the percentage of both was noticed.

(iii) *When N. P. & K were applied together.* The leaf content of all the three showed reduction irrespective of the dosages at which they were applied.

(iv) Whether the nutrients (N, P & K) were applied individually or combined, the calcium and magnesium contents showed reduction. The leaf analysis results are presented in Tables 5 A (pretreatment samples) and 5 B (post treatment samples)

## 5. *Observational trials with miscellaneous fertilizers.*

a) *Trial with an N K fertiliser, from sea bitterns.* An N K fertiliser containing 45% ammonium sulphate 47% ammonium chloride, 3.5% sodium chloride, 4.2% potassium chloride and 1% magnesium chloride as a fertiliser for coconuts compared with ammonium sulphate and unmanured control is under an observational trial. Due to the non-availability of the fertiliser this year's (the 4th annual) application could not be done. However, the trees were being observed for their response to the earlier doses of fertilizers and the yield data have been examined. The average yield of the trees during the present year showed a decrease compared to that of the

previous year. There is also no significant difference in yield among different treatments. The coefficient of variation is 28.46% which is greater than that obtained during the last year. This trial has unfortunately to be discontinued due to non-availability of the material. The results of the statistical analysis of the yield data of the trees are presented in Table 6.

(b) *Trial with Trisodium Phosphate.* A comparative study of the efficacy of Trisodium Phosphate (containing 17.8%  $P_2O_5$ ; 6.4%  $Na_2O_3$  and 0.8%  $NaOH$ ) as a phosphatic fertiliser compared to superphosphate for coconuts and also to ascertain its capacity to correct acid soils (due to its carbonate and hydroxide contents) was also carried out as another observational trial. The annual application of the fertiliser was carried out and the yield data recorded. It was found from the analysis of the yield data that although there is a definite increase in the average yield per tree due to the treatment the average yield per tree during the present year is less than that of the previous year. There was also no significant difference between the average yield per tree in the two treatments. It is also interesting to note that in the case of the control (no treatment) there was an increase in the average yield per tree last year whereas this year it has shown a decrease in the yield.

The results of the statistical analysis of the yield data of the trees under this trial are given in Table 7.

(c) *Trial with common salt.* The fourth addition of common salt at 10 lb. per tree (with a control) was given to the plot under this study. The yield data showed that the average yield per tree (51.6) in the control plot was higher than the treated plot (41.1) although the difference was not significant.

6. *Studies on Coconut Oil.* An important problem facing the coconut industry is that of getting the maximum possible yield of oil of good edible quality from copra. Coconut oil is a very highly priced commodity and the country is already in short supply in respect of this oil. The most logical thing will be to consider the feasibility of applying methods by which



the maximum extraction of oil in the copra and de-oiling of the cake could be achieved, such as by using safe solvents for its extraction. Alternatively the copra or cake may be pretreated to cytolyse the tissue material by using enzymes or other means with the object of getting released higher percentages of oils by the usual methods of extraction.

*Release of oil from copra and coconut kernel by the use of enzymes.*

Preliminary experiments carried out on the possibility of using a cytolytic enzyme for release of higher percentages of oil from copra and fresh kernel proved to be effective. The kinetics of the extraction at different concentrations of the enzyme at different temperatures of extraction and influence of the time of contact etc., were studied. It was seen that definitely more oil could be obtained from both copra and fresh kernel, at least about 3% more. Detailed studies are in progress on these and the keeping qualities etc., of the oil thus extracted.

#### *7. General analytical work.*

The different analytical determinations in soil, tissue and fertilizer samples from the different items of work in progress at this Research Station and those carried out for advisory help during the year under report included a total of 522 samples and were as follows:— (1) Moisture in 56 soil samples, (2) Hydrochloric acid soluble constituents in 156 soil samples, (3) available phosphoric acid and potash in 34 soil samples (4) mechanical composition of 22 soil samples, (5) nitrogen content of 42 soil and 38 tissue samples, (6) major nutrients in 58 tissue samples and 47 nut samples, (7) exchangeable bases in 35 soil samples, (8) value of two fertilizer samples as well as (9) oil contents of ten ripe nut samples. Besides complete chemical analysis of 22 soil samples, 12 from Neil Islands and 10 from the Central Arecanut Research Station, Vittal were also carried out for advisory help.

#### **Programme of work for 1958 - 59.**

1. Soil studies - plant nutrient contents of soil samples in the different cultural and manurial experiments.

2. Soil survey work.
3. Studies on plant material - Inter-relationships of nutrient ions in the plant tissues during healthy and under abnormal metabolic conditions.
4. Studies on the visual nutrient deficiency symptoms in coconut seedlings.
5. Studies on copra and coconut oil, curing of copra, oil extraction methods and storage of oil and oil cake.
6. Observational fertilizer trials.
7. General analytical work.

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## V - General.

1. *Supply of improved planting material.*

8490 selected coconut seedlings and 800 seed coconuts were supplied from the Research Station to outside parties during the period under report. A scheme for the procurement of seed coconuts for supply to States experiencing difficulty in obtaining quality planting material was started on 5th March 1958 and till the end of June 1958, 30,270 selected seed coconuts were supplied to the States of Assam, West Bengal and Tripura.

2. *Advisory.*

Advice on improved methods of coconut cultivation was given to a large number of coconut growers. Advisory suggestions were given regarding the suitability of some areas in the Neil Island for coconut cultivation based on the results of analysis of soil samples received from the Chief Commissioner, Andamans and Nicobar Islands Administration. Similar help was also rendered to the Arecanut Specialist, Indian Central Arecanut Committee.

3. *Co-ordination of Research on Coconut and Arecanut.*

The members of the Sub-Committee for Co-ordination of Research on Coconut and Arecanut visited the



Station during the year under report. Their recommendations are under consideration of the Indian Central Coconut Committee and Indian Central Arecanut Committee.

4. *Reviewing Committee.*

The members of the Sub-Committee constituted by the Indian Central Coconut Committee to review the work done at the Committee's two Central Coconut Research Stations during the past five years visited this Station during the year and their recommendations are being implemented.

5. *Exhibitions.*

Suitable exhibits were sent from this Research Station to all exhibitions in which the Indian Central Coconut Committee participated. Besides, exhibits were sent for the Indian Exhibition, Peking (China) and for display at the Offices of the Indian Council of Agricultural Research and Indian Agricultural Research Institute.

6. *Liaison between Research Workers and Extension Staff.*

Close liaison between research staff and extension workers with the object of popularising improved methods of coconut cultivation among the growers was established. Members of the Research Staff were deputed to deliver talks on improved methods of coconut cultivation at Gram Sevaks, Training Camps, Village Leaders' Training Camps etc; held under the auspices of National Extension Service Blocks.

7. *Tours.*

The Joint Director and Agronomist attended the meeting of the Coconut Fertilizer Demonstration Scheme held at Cochin and the meetings of the Sub-Committee on "Manurial trials in cultivators' fields" and "Technological Research" held at Hyderabad and also the meetings of the Sub-Committee for Co-ordination of Research on Coconut and Arecanut held at Ernakulam. The Cyto-Anatomist attended the meeting of the Horticultural Sub-Committee of the Indian Council of Agricultural

Research held at New Delhi. The Joint Director accompanied by Shri C. M. John reviewed the work of the Regional Coconut Research Stations under the Kerala Government. The Joint Director also visited the Central Food Technological Research Institute, Mysore to discuss the organisation of coconut technology work at the Central Coconut Research Station, Kasaragod.

8. *Remarks of the Indian Central Coconut Committee on previous year's report.*

<i>Remarks.</i>	<i>Action Taken.</i>
(i) A phased programme for the next ten years should be drawn up to replace the low yielding palms at the Station with high yielding ones.	Noted. The programme is being drawn up.
(ii) Priority is to be given for construction of staff quarters.	A phased programme for construction of quarters for the staff of the Research Station was drawn up some time ago but want of funds has been standing in the way of implementing the programme. Funds are, however, requested for in the Budget Estimate for 1959-60 for construction of quarters for Joint Director, Agronomist, Farm Assistant and watchman. The plans and estimates for these quarters have been prepared by the C. P. W. D.

*Publications.*

The following articles were contributed for publication:—

1. A note on the phosphate manuring of *Crotalaria striata*.



2. On the use of Potash as a fertilizer with its effect on yield, quality and disease resistance in the coconut palm.
  3. Influence of weather factors on the coconut crop.
  4. Green manure crops for coconut plantations.
  5. The problem of seasonal foliar yellowing in the coconut palm.
  6. Coconut gains its well deserved international importance.
  7. Studies on the keeping quality of ripe coconuts in storage.
  8. Varieties of coconut.
  9. Preliminary investigations on the durability of plaited coconut leaves.
  10. Fortifying influence of coconut water and cow's urine on 2, 4-Dichlorophenoxy acetic acid in the control of button shedding.
  11. Coconut breeding – a review.
  12. Possibilities of coconut improvement by the introduction of exotic varieties.
  13. Report on the possibilities of developing coconut cultivation in Kutch.
  14. A note on the study of a few exotic varieties of the coconut.
  15. Coconut breeding – some results.
  16. Coconut nursery studies-part I.
  17. Coconut varieties of Laccadive Islands.
  18. Optimum stage for harvesting coconuts for copra and coir manufacture.
  19. Saline water soaking in relation to the durability of coconut leaves (cadjans)
  20. Use of coconut water.
  21. Coconut manuring – time and method of application of manures.
  22. Manuring of coconut gardens – general considerations.
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# APPENDIX I - TABLE 1.

**Rainfall data for the period 4-6-1957 to 3-6-1958.**

Date	Standard week No.	1957-1958		1956-1957		Average for past 20 years	
		Rainfall in mms.	No. of rainy days	Rainfall in mms.	No. of rainy days	Rainfall in mms.	No. of Rainy days
South-West Monsoon							
June 4th to June 10th	23	214.9	5	282.7	7	229.4	5.57
June 11th to June 17th	24	111.8	4	140.7	6	283.7	6.40
June 18th to June 24th	25	436.4	7	297.9	7	244.1	6.45
June 25th to July 1st	26	239.3	7	644.9	7	249.4	6.05
July 2nd to July 8th	27	200.4	7	80.8	6	278.1	6.35
July 9th to July 15th	28	535.9	7	203.7	7	218.2	6.60
July 16th to July 22nd	29	150.9	6	218.4	6	298.2	6.40
July 23rd to July 29th	30	97.0	7	158.2	6	223.3	6.30
July 30th to August 5th	31	248.2	6	79.8	7	138.9	5.55
August 6th to August 12th	32	51.6	2	88.9	7	155.5	5.35
August 13th to August 19th	33	84.1	6	152.1	7	104.9	4.65
August 20th to August 26th	34	264.9	6	42.7	3	115.1	4.85
August 27th to Sept. 2nd	35	64.0	4	53.1	2	59.2	3.80
Sept. 3rd to Sept. 9th	36	9.7	1	97.8	5	74.7	4.60



**TABLE I - (Cont.)**

Date	Standard week	1957-1958		1956-1957		Average for past 20 years	
		No. Rainfall in mms.	No. of rainy days	Rainfall in mms.	No. of rainy days	Rainfall in mms.	No. of rainy days
Sept. 10th to Sept. 16th	37	40.3	5	30.0	2	42.4	2.25
Sept. 17th to Sept. 23rd	38	43.4	1	9.7	2	57.9	3.15
Total		2792.8	81	2581.4	87	2773.0	84.50

**North-East Monsoon.**

Sept. 24th to Sept. 30th	39	0.0	0	39.1	4	53.3	3.00
Oct. 1st to Oct. 7th	40	3.8	1	186.7	7	77.0	2.70
Oct. 8th to Oct. 14th	41	16.4	3	149.9	3	45.0	2.00
Oct. 15th to Oct. 21st	42	52.5	5	11.2	1	41.1	1.95
Oct. 22nd to Oct. 28th	43	42.2	2	41.1	2	31.2	1.70
Oct. 29th to Nov. 4th	44	7.1	1	38.9	2	24.4	1.30
Nov. 5th to Nov. 11th	45	72.7	2	59.7	3	15.4	1.10
Nov. 12th to Nov. 18th	46	16.5	2	1.0	0	25.9	1.15
Nov. 19th to Nov. 25th	47	0.0	0	0.5	0	20.3	1.05
Nov. 26th to Dec. 2nd	48	0.0	0	0.0	0	2.2	0.30
Dec. 3rd to Dec. 9th	49	0.0	0	0.0	0	12.8	0.35

**TABLE I - (Cont.)**

Date	Standard week No.	1957-1958		1956-1957		Average of the past 20 years	
		Rainfall in mms.	No. of rainy days	Rainfall in mms.	No. of rainy days	Rainfall in mms.	No. of rainy days
Dec. 10th to Dec. 16th	50	0.0	0	0.0	0	9.4	0.40
Dec. 17th to Dec. 23rd	51	0.0	0	0.0	0	17.9	0.20
Dec. 24th to Dec. 31st.	52	0.0	0	0.0	0	0.1	0.00
Jan. 1st to Jan. 7th	1	0.0	0	0.0	0	2.6	0.15
Jan. 8th to Jan. 14th	2	0.0	0	0.0	0	0.2	0.05
Jan. 15th to Jan. 21st	3	0.0	0	7.6	1	0.5	0.05
Jan. 22nd to Jan. 28th	4	0.0	0	0.0	0	0.4	0.05
Total		211.2	16	535.7	23	379.7	17.50

**Hot Weather.**

Jan. 29th to February 4th	5	0.0	0	0.0	0	0.5	0.05
February 5th to February 11th	6	0.0	0	0.0	0	0.1	0.00
February 12th to February 18th	7	0.0	0	0.0	0	2.1	0.20
February 19th to February 25th	8	0.0	0	0.0	0	2.7	0.05
February 26th to March 4th	9	0.0	0	4.8	1	1.0	0.10
March 5th to March 11th	10	0.0	0	0.0	0	0.7	0.05



March 12th to							
March 18th	11	0.0	0	0.0	0	3.1	0.15
March 19th to							
March 25th	12	0.0	0	0.0	0	0.1	0.00
March 26th to							
April 1st	13	0.0	0	Drizzle	0	1.6	0.15
April 2nd to							
April 8th	14	0.0	0	0.0	0	3.2	0.30
April 9th to							
April 15th	15	1.0	0	3.6	1	13.3	0.85
April 16th to							
April 22nd	16	5.4	1	8.1	1	14.5	0.90
April 23rd to							
April 29th	17	4.6	1	0.0	0	24.3	1.30
April 30th to							
May 6th	18	27.9	2	5.1	1	17.3	0.95
May 7th to							
May 13th	19	4.4	1	6.1	1	13.8	0.80
May 14th to							
May 20th	20	46.2	3	20.8	2	62.2	1.75
May 21st to							
May 27th	21	19.8	3	210.6	5	77.0	2.85
May 28th to							
June 3rd	22	25.9	1	107.2	4	118.6	3.40
Total		135.2	12	366.3	16	356.1	13.85
Grand Total		3139.2	109	3483.4	126	3508.8	115.85

# APPENDIX I - TABLE - 2.

Summary of weather data other than rainfall for the period  
July 1957 to June 1958.

Month	Maximum temperature in oC			Minimum temperature in oC			Humidity %			
		Highest	Lowest	Average	Highest	Lowest	Average	Highest	Lowest	Average
July	1957	31.6	25.5	28.8	26.3	22.2	23.6	100	83	95
August	"	31.0	25.4	28.9	25.1	22.1	23.6	100	88	95
September	"	31.1	25.8	29.6	25.3	21.4	22.8	100	79	92
October	"	32.6	28.3	31.1	25.0	22.3	24.0	98	82	92
November	"	34.6	27.2	32.2	24.9	20.2	23.0	100	72	91
December	"	35.7	30.7	33.7	24.6	20.1	22.1	97	67	87
January	1958	34.6	29.4	32.3	24.1	18.0	21.3	97	68	90
February	"	32.8	30.9	32.1	23.6	20.8	22.3	99	83	92
March	"	35.0	26.7	32.6	27.4	21.3	23.8	97	75	87
April	"	35.8	32.2	34.2	28.5	23.5	25.8	95	68	84
May	"	35.3	30.4	32.8	29.2	22.5	25.9	100	73	88
June	"	34.9	26.1	30.8	27.3	22.1	24.5	100	79	91



APPENDIX I - TABLE - 2 Contd.  
Summary of weather data other than rainfall for the period  
July 1957 to June 1958.

Month		Wind velocity in km pH		Sunshine in hours		Evaporation from Piche		Evaporimeter (in mms)		
		Highest	Lowest	Average	Lowest	Average	Lowest			
July	1957	4.33	0.58	2.48	8.60	0.00	2.67	2.7	0.0	1.2
August	"	4.15	0.76	1.94	10.05	0.00	4.45	2.5	0.2	1.0
September	"	3.01	1.16	2.05	9.90	0.10	7.73	2.6	0.7	1.6
October	"	4.39	1.27	2.23	9.55	2.25	6.72	3.1	1.1	1.9
November	"	3.64	0.79	2.36	9.90	0.90	7.77	5.1	0.9	2.8
December	"	4.01	1.11	2.58	9.95	0.80	8.56	6.4	3.1	4.2
January	1958	5.26	1.51	2.79	9.80	3.90	9.32	6.0	1.4	3.1
February	"	5.41	2.14	3.51	9.60	8.00	9.18	5.7	2.4	4.0
March	"	5.01	1.87	3.27	9.60	5.08	9.07	5.6	3.0	4.1
April	"	4.54	1.92	3.26	10.47	1.58	8.82	5.6	2.7	4.2
May	"	6.00	1.22	3.13	11.12	8.82	5.81	5.5	0.9	3.0
June	"	5.36	1.63	2.96	11.07	0.00	4.01	4.3	0.3	2.1

# APPENDIX - I    TABLE - 3.

Analytical data on comparative studies of barren and good nuts.

Tree No.	Sample	Moisture %	Nitrogen %	P <sub>2</sub> O <sub>5</sub> %	K <sub>2</sub> O %	CaO %	MgO %	Remarks
T <sub>1</sub>	Barren nut	204.4	1.477	0.5582	1.7677	Trace	0.160	Average of 4 barren nuts from the same bunch at one harvest
	Good nut	74.69	1.106	0.4138	0.5578	"	0.140	
T <sub>2</sub>	Barren nut	179.90	1.512	0.6114	2.4225	"	0.140	Only one barren nut
	Good nut	70.03	1.036	0.4378	4.3595	"	0.160	
T <sub>3</sub>	Barren nut	155.25	1.565	0.4632	1.6760	"	0.208	Average of 5 barren nuts from the same bunch at one harvest
	Good nut	64.89	1.190	0.3273	0.6591	"	Trace	
T <sub>4</sub>	Barren nut	263.40	2.051	0.8559	1.8090	"	0.427	Average of 2 barren nuts from the same bunch at one harvest
	Good nut	74.47	1.204	0.3613	0.4794	"	0.200	
T <sub>5</sub>	Barren nut	112.78	1.148	0.5027	1.0592	"	0.223	Average of 5 barren nuts from the same bunch at one harvest
	Good nut	72.39	1.162	0.3798	0.6420	"	Trace	
T <sub>6</sub>	Barren nut	231.60	1.344	0.9079	1.9731	"	0.310	Average of 2 barren nuts from the same bunch at one harvest.
	Good nut	74.69	1.162	0.4385	0.6848	"	0.180	
T <sub>7</sub>	Barren nut	108.22	1.512	0.7921	1.3782	"	0.250	Average of 2 barren nuts from the same bunch at one harvest.
	Good nut	59.15	1.064	0.5064	0.5136	"	0.180	
T <sub>8</sub>	Barren nut	260.21	1.890	0.6269	1.4552	"	0.240	Only one barren nut
	Good nut	60.98	1.120	0.4910	0.1455	"	0.120	



# APPENDIX - I TABLE - 4

*Summary of the results of analysis of the observations under the experiment of foliar yellowing of coconut trees.*

Treatments	Average No. of yellow leaves taken as a fraction of total No. of leaves.	Whether differences are significant or not.	Critical difference.
	1956-57	1957-58	
N+P+K	0.192	0.137	
N+P+K+Fe	0.145	0.122	
N+P+K+Cu	0.148	0.112	
N+P+K+Zn	0.152	0.181	
N+P+K+Mn	0.133	0.146	YES 0.019
N+P+K+B	0.112	0.132	No. of yellow
N+P+K+Mg	0.147	0.137	leaves as a fra-
N+P+K+Mo	0.090	0.096	ction of total
N+P+K+lime	0.143	0.141	number of leaves.

# APPENDIX - I TABLE-5. A.

*Nutrient contents of leaves from coconut seedlings under the study of NPK deficiency symptoms (Pre-treatment samples)*

Lab. No.	Description	N (%)	P <sub>2</sub> O <sub>5</sub> (%)	K <sub>2</sub> O (%)	CaO(%)	MgO (%)
	Leaves of seedlings from					
132	control	—	0.1818	1.340	0.744	—
133	„ N <sub>1</sub>	0.812	0.1965	1.066	0.781	0.576
134	„ P <sub>1</sub>	0.784	0.3658	1.094	0.781	0.592
135	„ K <sub>1</sub>	0.770	0.3156	0.838	0.893	0.576
136	„ N <sub>1</sub> P <sub>1</sub>	0.784	0.1714	1.328	0.865	—
137	„ N <sub>1</sub> K <sub>1</sub>	0.798	0.1818	—	0.800	0.528
138	„ P <sub>1</sub> K <sub>1</sub>	0.742	0.1839	1.186	0.744	0.544
139	„ N <sub>1</sub> P <sub>1</sub> K <sub>1</sub>	—	0.3198	1.169	0.893	0.624
140	„ N <sub>2</sub>	0.980	0.1374	1.117	0.700	0.504
141	„ P <sub>2</sub>	0.784	0.1420	1.180	0.700	0.45
142	„ K <sub>2</sub>	0.868	0.139	1.140	0.616	0.48
143	„ N <sub>2</sub> P <sub>2</sub>	0.868	0.139	1.040	0.728	0.504
144	„ N <sub>2</sub> K <sub>2</sub>	0.840	0.1626	1.37	0.721	0.504
145	„ P <sub>2</sub> K <sub>2</sub>	0.840	0.142	1.250	0.686	0.384
146	„ N <sub>2</sub> P <sub>2</sub> K <sub>2</sub>	0.890	0.1497	1.13	0.721	0.66

APPENDIX - I - TABLE 5 B.

Nutrient contents of leaves from coconut seedlings  
under the study of NPK deficiency symptoms  
(after treatment samples)

Lab. No.	Description	N(%)	P <sub>2</sub> O <sub>5</sub> (%)	K <sub>2</sub> O(%)	CaO(%)	MgO(%)
	Leaves of seedlings from					
69	control	0.712	0.1760	1.712	9.896	0.720
70	„ N <sub>1</sub>	1.398	0.223	1.669	0.448	0.360
71	„ P <sub>1</sub>	0.756	0.1976	1.481	0.756	0.696
72	„ K <sub>1</sub>	0.700	0.1853	2.286	0.784	0.528
73	„ N <sub>1</sub> P <sub>1</sub>	1.344	0.2872	1.148	0.448	0.324
74	„ N <sub>1</sub> K <sub>1</sub>	1.302	0.1976	2.160	0.392	0.264
75	„ P <sub>1</sub> K <sub>1</sub>	0.826	0.2192	2.260	0.728	0.288
76	„ N <sub>1</sub> P <sub>1</sub> K <sub>1</sub>	1.274	0.2656	1.862	0.364	0.252
77	„ N <sub>2</sub>	1.582	0.2409	1.207	0.308	0.216
78	„ P <sub>2</sub>	1.710	0.2007	1.824	0.448	0.636
79	„ K <sub>2</sub>	0.756	0.1369	2.525	0.980	0.504
80	„ N <sub>2</sub> P <sub>2</sub>	1.554	0.2378	1.190	0.896	0.252
81	„ N <sub>2</sub> K <sub>2</sub>	1.316	0.1606	1.892	1.120	0.240
82	„ P <sub>2</sub> K <sub>2</sub>	0.616	0.1544	2.525	1.036	0.480
83	„ N <sub>2</sub> P <sub>2</sub> K <sub>2</sub>	1.442	0.2347	1.584	0.784	0.228

APPENDIX - I - TABLE 6.

Results of the statistical analysis of the yield data  
of trees under the trial with N. K. fertiliser  
from sea bitterns.

Treatment	Mean yield of ripe nuts per tree	Whether differences are significant or not
1. Sea bitterns + super- phosphate + muriate of potash	58.0	



2.	Ammonium sulphate + super phosphate + muriate of potash	57.0	
3.	Control or no manure	51.6	No
4.	Common salt + super- phosphate+ammonium	54.6	

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#### APPENDIX – I – TABLE 7.

Results of the statistical analysis of the yield data  
of trees under trial with trisodium phosphate

Treatment	Mean yield of ripe nuts per tree	Whether the differences are significant or not
1. Control (or no manure)	15.7	
2. Ammonium sulphate + super phosphate + muriate of potash	43.4	Yes
3. Ammonium sulphate + trisodium phosphate + muriate of potash	38.4	

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## APPENDIX V

### Secretary's Note

*Subject No. 14.* Central Coconut Research Station, Kasaragod — Observations of Professor J. B. S. Haldane on the work of.

Prof. J. B. S. Haldane of the Indian Statistical Institute, Calcutta, visited the Central Coconut Research Stations, Kayangulam and Kasaragod in June 1958. An extract from his letter addressed to the Chief Minister of Kerala State about the working of the stations is reproduced below:—

“I also admired what I saw at the Coconut Research Station at Kayangulam, particularly the work of Shri T. A. Davis. Unfortunately, I cannot say the same of Kasaragod. The coconut breeding programme there seems to me, quite frankly, to be a waste of money. The breeding of coconuts is clearly a unique problem, as a generation takes some ten years, and one cannot assess the value of a tree adequately till it is twenty years old. Such work requires originality and intensive planning. It is useless to entrust it to young men with little knowledge of genetics, and ignorant of work published by workers in Calcutta on the coconut and other palms.”

In forwarding the above extract, the President of the Committee called for the comments of the undersigned and the Director, Central Coconut Research Station, Kayangulam. A copy of the comments offered by us is attached (Vide Annexure I). In reply, the Under Secretary to the Government of India, Ministry of Food and Agriculture, stated that Prof. Haldane's observations with regard to the coconut breeding work at the Central Coconut Research Station, Kasaragod, should be placed before the Committee which may like to appoint a small Sub-Committee of geneticists and plant breeders to suggest, on broad outlines, a programme of work to be carried out at that Station.

After visiting the Central Coconut Research Stations, Kayangulam and Kasaragod, Prof. Haldane forwarded an article entitled “Suggestions for Research



on Coconuts" for publication in "The Indian Coconut Journal". A copy of that article is also attached (Vide Annexure II). The Under Secretary to the Government of India, Ministry of Food and Agriculture has stated that this article should also be placed before the Committee.

The Committee may now consider the criticism of Dr. Haldane on the breeding work being carried out at the Central Coconut Research Station, Kasaragod, the comments thereon offered by the undersigned and the Director, Central Coconut Research Station, Kayangulam as well as Dr. Haldane's article on "Suggestions for Research on Coconuts" and appoint a sub-Committee of geneticists and plant breeders to draw up a programme of work to be carried out at the Central Coconut Research Station, Kasaragod.

The subject may first be considered by the Agricultural Research & Development Sub-Committee (Research Wing).

## ANNEXURE I

Comments on the observations made by Prof. J. B. S. Haldane about the work of the Central Coconut Research Stations.

The remark made by Prof. Haldane that coconut breeding work at Kasaragod is a waste of money appears to be unfortunate and rather sweeping. We agree with Prof. Haldane that breeding on coconut is a very long range problem. The work that has now been undertaken may not perhaps be quite comprehensive enough in its fundamental aspect. In this connection it is pointed out that in the different directives received for implementation from time to time by two Reviewing Committees, emphasis is always being made on getting results of practical value which could be immediately handed over to the coconut growers for adoption. This has naturally lessened the freedom for the scope of work to some extent. Prof. Haldane's suggestions involve the carrying out of the investigations for about 40 to 50 years

to know whether it would be possible to obtain results better than what we are getting from the first generation hybrids. We have on our breeding programme the following items of work. For example, hybridisation between T x D and exotic varieties, study of optimum parental combination in T x D, production of natural cross hybrids in D x T, selection, study on mother palms and their progenies, introduction and study of exotic varieties etc. These items of work have been seriously taken up since 1951 and are being implemented according to the facilities available.

Prof. Haldane has in an article which he has sent for publication in the Coconut Journal (Copy enclosed) made a number of suggestions for research on coconuts. Many of the items are already on our programme of work. Some of them like the Vegetative Propagation of Coconuts, would at the present state of our knowledge, appear to be impracticable. However, work on this aspect has also been taken up. Some of the practical results of work on coconut breeding obtained are:-

1. Production of good quality planting material by selection.
2. Production of T x D hybrids.
3. Introduction of promising exotic varieties etc.

The seedlings thus produced in our Kasaragod Station have become exceedingly popular with the coconut growers throughout India and it is not an exaggeration to state that we are not able to meet the demands for our seedlings in the above categories each year. The other day I had discussions with the N. E. S. Block Development Officer of Alangad in Kerala and he stated that there is so much demand for Kasaragod seedlings that cultivators in his area are even prepared to pay Rs. 5/- each for the Kasaragod seedlings in preference to the seedlings of the State nurseries which are at present supplied at the rate of 8 annas per seedling.

It may be remembered that the work at the Central Coconut Research Stations has been reviewed by two Expert Scientific Reviewing Committees, one in 1953 and the other in 1957. These two committees had not



made any adverse comments on the breeding programme in progress at Kasaragod. Some suggestions made by the Expert Reviewing Committees have been taken up for implementation. On a long term crop like coconuts, it is very difficult to show substantial work within a short period of time and during the period we have been at it we have tried our best to execute the approved scientific programme of work. Prof. Haldane has mentioned about some work done at Calcutta on coconut and other palms. It may be stated that the staff working at the Research Stations are familiar with all important works done on coconuts at Calcutta and elsewhere. Prof. Haldane has laid some stress on some experimental trees exhibiting branches etc. At present these have been observed as freaks and have not been met with in the course of breeding experiments conducted since 1922.

In conclusion it may be stated that Prof. Haldane's comments have to be viewed against the background of an article on coconut breeding published by him as early as December, 29, 1957 in "The Hindu". It is possible that he came to Kasaragod with his mind already made up and the time at his disposal at Kasaragod was also far too short to have a fuller study of the work done on this perennial crop and these may perhaps explain the uncharitable nature of his criticism.

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## ANNEXURE II

Suggestions for research on coconuts

By

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This article demands an apology. I am ignorant of the details of coconut culture, and have only spent a few hours at the Research Stations at Kayangulam and Kasaragod. I have therefore no doubt that many of my suggestions will be impracticable for different reasons. However they may stimulate others to work along lines

similar to those which I have suggested, but more likely to be successful.

### Mixed cropping.

The soil beneath a coconut grove is capable of bearing another crop. This may be a "green manuring" plant such as *Glyricidia* whose sole function is to aid the palm trees. If however the plants grown under the trees are to be harvested, I think one should consider three quite distinct questions.

1. Is it economically advantageous to grow x under coconut palms, not necessarily in every year, under existing conditions of manuring? In Kerala x might be a nutritious crop such as tapioca, or one such as cloves, black pepper, or pan, (vettila) the last of which demands shade in any case. In West Bengal, pineapples and arrowroots are often grown.

2. If it is found that such double cropping exhausts the soil and reduces the yield of coconuts under existing conditions, does it do so if chemical fertilizers are applied intensively? If so it may be an economic proposition ten years hence, when India's output of fertilizers has been greatly increased. A knowledge of such possibilities will greatly help economic planning.

3. Is it practicable, if there is a threat of famine, to plant an important and quickly growing food source, which in Kerala would probably be tapioca, under coconut palms, without immediately reducing their yield? Such planting could be justified as an emergency measure, even if it would exhaust the soil and lower yields grossly if continued for a number of years.

These questions would of course have to be answered for several different types of soil in Kerala, and later, no doubt, in other States. It is natural enough that stations charged with research on coconuts should concentrate on the question of how to get the highest yield of nuts or oil per acre per year. But the questions asked above are also important both in the public interest and in that of the cultivators.



## Bees.

I understand that the relative importance of wind and insect pollination of coconut palms is a matter of controversy. This suggests that in some circumstances insects may be important. It is very easy to decide this matter experimentally. They are extremely important for English fruit crops. Indeed it has been stated that in England the value of bees in enhancing the yield of fruit trees is about three times that of the honey which they produce.

Their values, if any, in Kerala, could readily be discovered. I understand that bee-keeping is quite an important occupation in Coorg, but that bees often die in the hot weather in the plains, and may migrate uphill. It might therefore be necessary to take the bees into the hills during a part of the year. Fortunately in Kerala this would not be a long journey. The honey produced from the palm trees would be a clear addition to our food supply, but unless there was also a gain in coconut yield it might not pay for the labour and materials needed.

Linked up with this are two other questions. Would the insecticides used on coconut palm trees and other crops in the neighbourhood kill hive bees? And do they kill wild bees and other insects to such an extent as to lower the frequency of successful pollination, and thus the yield of coconuts?

## Paternal influences on nuts.

Before I consider the possibilities of breeding, I should like to raise the question of the influence of the pollen parent on the coconut. The cultivated plant which, from this point of view, resembles the coconut palm most closely, and which has been well studied, is maize. Here, as in coconuts, the endosperm is the most important tissue from the human point of view. Although its nuclei contain two maternal sets of chromosomes and only one of paternal chromosomes these latter can have an important influence on the carotene

content, the type of carbohydrate, the content of several vitamins, and the anthocyanin coloration.

It should be possible to compare the size, oil content, and perhaps other characters, of the nuts borne on the same tree after using pollen from two different "male" parents. It would be worth using as pollen parent a tree with poor oil yield to give as high a contrast as possible with one of the desired type.

The result of such experiments would have no immediate bearing on breeding, however, it would at least tell us something about the genetical determination of the characters of the actual nut. There is another reason for making such experiments. Work on the genetics of the coconut must be very tedious. One may expect, in a life-time, to get information of the type which one obtains in a month with *Drosophila melanogaster*, for example evidence that an abnormality is recessive or that two genes are or are not linked. Unless the workers concerned are allowed to work on other genetical problems they will have to concentrate on other sides of coconut biology, and will get no experience of genetics. Ideally I believe they should be encouraged to breed annual plants. If not they could at least attack the question of the effect of pollen on the nuts.

### Vegetative propagation.

If it is possible to propagate a plant vegetatively, the plants derived from a single seedling by vegetative propagation form a clone whose members, in a constant environment resemble one another very closely. Examples are named varieties of potatoes, roses, mangos and seedless bananas. Many new clones of tapioca have recently been produced in Kerala, Holttum (1955) Harland (1957) and perhaps others, have pointed out that if coconut palms could be propagated vegetatively, by planting cuttings, or by grafting on to seedlings, trees of high yield could be multiplied indefinitely. There are considerable differences in the yield of trees growing under very similar conditions. If one could propagate the best 1% of trees in Kerala vegetatively there would be a



very considerable increase in yield, though I have failed to discover data which would permit its estimation.

No method has yet been invented to permit the vegetative propagation of a given tree, though it could be rejuvenated, and perhaps grown for another century or longer, by inducing aerial roots, sawing through the trunk below them, and replanting (Menon, Davis, Anandan, and Pillai 1955). It would surely be worth doing this systematically to trees of exceptionally high yield, if only to preserve them for future breeding. However Davis (1950, 1956) reports branching in exceptional trees. If a tree can be propagated vegetatively, for whatever reason, it is of value in manurial trials even if its yield is low.

For the yields of two or more members of a clone in the same environment are probably very close. If so the differences between their yields in different environments are mainly due to the environmental differences. Bonnier (1948) and his colleagues found that by using pairs of monozygotic twins he could reduce the number of calves needed in an experiment of the effect of diet on milk yield to about one twentieth of that required when comparisons were made between calves from the same herd. The use of vegetatively propagated trees may therefore allow far more trials to be made than are at present possible.

### Statistics.

I had hoped, on visiting Kerala, to obtain statistics, say, on the yield of copra from each of several hundred trees over a period of ten years. I was unable to obtain such figures even for the numbers of nuts. It appears that they exist for the Indian West Coast breed, but have not been adequately analysed. If nut number is counted, one of the first needs is to discover for how many years one must do so to get a reasonable estimate of the tree's performance in later years. It may be found that some trees reach their maximal yield much earlier than others. Correlation analysis should be done in two distinct ways. On the one hand, if data on the yields of, say, 100 trees over 15 years were available, the

technique of serial correlation applied to each tree separately would presumably demonstrate a negative correlation between yields in successive years for some of the trees which "only fruit well in alternate years". It is important to know if this is a sharply defined character, how it is inherited and whether it can be overcome by the use of fertilisers. Secondly variations between the yields of trees in a group in different years should be worked out. Perhaps regression analysis would be better. The kind of question to be asked is this: "How accurately we can predict the yield of a tree in 1958 from a knowledge of its yields in the years 1953 to 1957 inclusive? Is there any serious advantage in using figures over 10 rather than 5 years or would less than 5 be sufficient?"

If we know the distribution of (say) ten-year yields for a group of trees we can ask what would be the increase of yield if we could arrange, by breeding, husbandry, or a combination, to get a group of trees whose average yield was as high as that the best ten per cent of the group. This, I think, gives us an idea of what might be attained within thirty years or so. Until members of a clone have been compared, we shall only be able to guess at how much of the observed variation is genetically determined.

Meanwhile statistics on the oil yield of individual trees are much to be desired. We have a precisely similar problem in the case of cows. Here the milk yield and butter percentage vary more or less independently, and both are genetically determined to some extent. But the butter fat percentage seems to be much less dependent on diet than the total yield.

Only when we can assess the value of an individual tree by quantitative methods can we hope to get the utmost value from a programme of improvement by selective breeding.

### Formal genetics.

In most domestic animals and plants a number of characters are known which are inherited according to



Mendel's laws, or some slight modification of them. Such characters are rarely of great economic importance, except that deviations from the norm of a breed are usually undesired. However their study has more than paid for itself. Such characters should be studied in the coconut. Results obtained at Kasaragod, for example, were compatible with the view that the variety *spicata* is dominant over the normal, though they certainly did not prove it.

One point is perhaps worth making. A variety which is a "freak" in most environments may be most valuable in others. For example, small-combed poultry are bred in Southern India to lessen the danger of bleeding during cock fights. The genes which reduce the comb size in these breeds have been transferred to high-laying breeds to avoid injury to combs by frost, both in U. S. S. R. and Canada. Genes which lessen the feathering characterise "fancy" breeds in temperate climates, but are found in tropical breeds which are kept entirely for egg and meat production. It is possible that some variants may prove to be particularly valuable in unfavourable soils or resistant to particular infections.

In the study of formal genetics two things are essential. First the paternity of every plant must be known with certainty. Secondly, all the progeny of a cross or a self-fertilisation must be grown. If seedlings which do not grow rapidly or are in other respects below the usual norm, are discarded, formal genetics cannot be investigated.

### Self-fertilization.

There are two rather distinct reasons why the effects of self-fertilization should be studied. In the first place the fact that it is known to depress vigour, as shown by Patel (1938) and others makes it highly probable that if fairly homozygous lines were produced by, say, three generations of self-fertilization, the progeny of a first cross between two such lines would not merely show greater vigour than either parent, but also more than the average random bred plant. This is sufficiently often so in maize to make this method economically valuable.

Secondly, individual plants of an outbred species like the coconut are likely to be heterozygous for a variety of recessive characters. Most of these will only be of interest for formal genetics, but some may be of economic value.

However by rejecting the slowly growing seedlings the majority of these recessives will be lost, and, what is more serious, the relatively homozygous plants, whose crossing might be economically valuable, will probably be lost too. The pure lines of maize whose crossing has proved of such value in the U.S.A. are mostly miserable-looking plants which would be weeded out in any selection programme. It thus seems that so far the products of self-fertilization of coconuts are likely to be of little economic value, but this need not be the case in future if attention is paid to the principles of genetics.

### Selection.

Until more work has been done to assess the performance of individual trees and to follow up the yield of trees, the yield of whose mother and father are both known, I am not convinced that we need accept the conclusions of Pieris (1934) and others as to the inefficacy of parent selection, which are based on selection of seed parents only. However the heritability of yield is probably fairly low. Gangolly, Satyabalan and Pandalai (1957) seem to follow Pieris in placing more reliance on seedling selection. In view of the findings in Ceylon it would seem that parent selection may be more efficient in one population and seedling selection in another. It therefore seems desirable to confirm the efficiency of seedling selection under Indian conditions and measure it at least roughly, by growing say 30 seedlings which would have been rejected, for long enough to estimate their yields.

Harland (1957) stresses the possibility of finding trees most of whose progeny have a high yield. The difficulty of such a programme lies in the very large number of progeny which must be tested before such a "prepotent" tree is identified with near certainty. I am glad to see that Harland's suggestion is being taken



seriously in Kerala. It seems to me premature to lay down a programme of selection until the data which have, apparently, been collected are subjected to statistical analysis, and set out in such a form that they can be examined by geneticists with experience of organisms in which generations are shorter.

I think that a sharp distinction should be made between two programmes. On the one hand selection of a rough and ready kind may be practised without artificial pollination. On the other, a programme of a more scientific character, based on artificial pollination, and including some breeding from trees of low yield, might be carried out at one or more stations.

### **The dwarf palm.**

Gangolly, Satyabalan and Pandalai (1957) summarize the existing knowledge of the performance of dwarf palms and their hybrids with tall. This does not include any information as to the genetic determination of dwarfness. I am told that some progeny of hybrids are to be seen at Nileshtar, but it does not seem to be known whether the character of dwarfness is mainly due to a single gene (which we may provisionally call *D*, since the heterozygotes *Dd* are intermediate between *DD*, dwarf, and *dd* tall, in some characters). There seems to be no doubt that in some important characters the hybrids are superior to their tall parents. If dwarfness is mainly due to a single gene the following question arises. Are the hybrids superior mainly because they are *Dd*, or is this superiority due to genes at many loci? If the former hypothesis is correct, then *Dd* x *dd* or *dd* x *Dd* should give about equal numbers of *Dd* and *dd* and the former should be superior from an economic point of view. It would then be possible to introduce *D* into various races of Indian Coconut. Until the necessary genetical information is obtained one cannot make further detailed suggestions.

### **Foreign Breeds.**

A number of nuts of foreign breeds have been planted at Kasaragod, and results are awaited. It is perhaps unlikely, though not impossible, that any of the

trees derived from them will prove superior to the local variety. It is much more likely that first generation hybrids of these breeds, either with Indian breeds, or with one another may prove to be of value. Here again no sure conclusions can be reached unless the paternity of each plant is known. The fact that trees of a given breed do not do particularly well in Kerala does not prove that hybrids derived from them may not do so. If the hybrids are thought desirable it may or may not be found that later generations derived either from back-crossing or from the inter-crossing of hybrids will be of value. But it is most important that hybrid trees should not be discarded because they appear to be of little value. The desirable characters of two breeds may disappear in the first cross, but in later generations plants may appear which combine them or show new desirable characters. It will be seen that we have to ask a number of distinct questions, that the answer to one gives little guidance concerning the answer to another and that experiments should be planned to answer as many as possible.

### Conclusions.

I must thank Dr. P. J. Gregory for permitting me to visit Kayangulam and Kasaragod. I am fully aware that research of any kind on coconuts must be a slow process at best. Just for this reason the methods used must be as efficient as possible. If an experiment on *Drosophila* can be completed in 20 weeks rather than 30 it may not be worth while taking the trouble needed to accelerate it. It is worth taking a lot of trouble to reduce the time needed to find out something about coconuts from 30 years to 20. This is likely to be achieved by the fullest possible use of statistical and genetical techniques. I have also suggested some other questions whose solution should not be too difficult, and which might be of economic value.

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## APPENDIX VI

### Secretary's Note

*Subject No. 15.* Regional Coconut Research Stations in Kerala State – Review of work done at

The Committee at its last meeting (January 1958), while approving of the progress report on the 3 Regional Coconut Research Stations in Kerala State for the year ended 30-6-1957, had decided that Shri C. M. John and Dr. K. M. Pandalai be requested to visit the stations, review their work, and make suitable recommendations regarding their future. (Vide Subject No. 14 of the Proceedings of the 25th meeting).

Shri John and Dr. Pandalai accordingly visited the stations in April 1958 and reviewed the work done at them. A copy of the joint report submitted by them is attached to this note. A few of the important recommendations made by them are indicated below.

1) Due to certain defects of the site of the Thodupuzha Station, that station may be closed down and necessary fresh area acquired for a regional research station with similar or identical soil type.

2) The Kumarakom Station must have a reclamation scheme of at least 50 acres and the station should be developed.

3) The Station at Neyyattinkara may be continued on a restricted scale for 5 years more. In the meantime necessary new area may be acquired and work started.

As the sanctioned period of the 3 stations was due to expire on 21st December 1958 and as the Committee would be meeting only in January 1959, the joint report was placed for the consideration of the Finance Sub-Committee of the Committee at its meeting held on the 22nd September 1958 with the suggestion that sanction might be accorded for continuing the stations, on the existing basis, pending the Committee's decision regarding the future working of the scheme. The Finance Sub-Committee decided that the stations at Kumarakom and Neyyattinkara be continued for a period of one year from 22-12-1958 subject to the recommendations made by

Shri C. M. John and Dr. Pandalai, and that the Thodupuzha station be closed down on 21-12-1958 on the termination of the sanctioned period.

The Finance Sub-Committee's decision was duly conveyed to the Kerala Government. They intimated that the lease period of the site of the Thodupuzha Station was due to expire on 27th October 1958 and that it was proposed to close down the station on that date instead of on 21-12-1958. They also requested for the Committee's concurrence of the proposal. The matter was therefore referred to the President of the Committee. The President accorded sanction for closing down the station on 27-10-1958 subject to ratification by the Committee, and the station was closed down.

The Committee may now ratify the sanction accorded by the President for closing down the Regional Coconut Research Station at Thodupuzha and also decide whether the recommendations made in the joint report of Shri C. M. John and Dr. Pandalai regarding the future of the scheme may be approved.

As regards the continuance of the Stations at Kumaarakom and Neyyattinkara, it is suggested that they may be extended for a period of 3 years from 22-12-1959 on which date they would have completed 12 years of work.

The general condition relating to sharing of expenditure on research schemes is quoted below:—

“Research schemes may be financed upto a period of 10 years subject to review at the end of the third, fifth and eighth year, the Committee ordinarily bearing 50% of the recurring expenditure, but a greater proportion in exceptional cases. To justify further financial help from the Committee after this period, special technical or scientific reasons are necessary. During the extension period (beyond the 10th year) the Committee's share of expenditure will normally be limited to 33½%, any higher contribution being made only for special reasons”.

The Committee may also decide the proportion in which the recurring expenditure on the scheme is to be shared during the extension period from 22-12-1959.



The subject may be considered first by the Agricultural Research and Development Sub-Committee (Research Wing).

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Report submitted by  
**Shri. C. M. John and Dr. K. M. Pandalai**  
on the working of the Regional Coconut  
Research Stations of the Kerala State

The Indian Central Coconut Committee at its 25th Meeting held on 31st January 1958 at Calicut, while adopting the progress report of the scheme for the year ended 30-6-1957 decided that Shri C. M. John and Dr. K. M. Pandalai be requested to visit and review the work in progress at the three Regional Coconut Research Stations and make suitable recommendations regarding the future of the stations.

Shri. C. M. John and Dr. K. M. Pandalai accordingly visited the three regional stations during the week beginning 7th April 1958 and reviewed the work in progress at these stations. They had discussions with the Director of Agriculture and the Plantation Crop Specialist, Kerala State as well as the Director, Central Coconut Research Station, Kayangulam. They had also the benefit of considering a note by the Deputy Director of Agriculture, Coconut Development. The following observations are being placed before the Committee as a result of this review work.

The three Regional Coconut Research Stations representing three important soil types in which coconuts are largely grown in the west coast viz. laterite soil of hill slope, reclaimed black clay soil of back water area and deep red loam of South Kerala were started at Thodupuzha, Kumarakom and Neyyattinkara about 10 years back in leased out land. The work at these stations which is confined only to manurial and cultural trials on adult palms is being conducted for the past 10 years based on a Technical Programme approved by the Indian

Central Coconut Committee. These trials had to be restricted in scope due to certain limitations particularly the terms of the lease. On an assessment of the work carried out so far at these stations, we have come to certain conclusions and wish to make the following recommendations:—

1. *Regional Coconut Research Station, Thodupuzha*

(1) As mentioned already this Station has been established on land taken on lease from a private party. The staff has only the right of conducting the experiments. There are lots of jungle growths in the area, the land is uneven and undulating and certain portions are rocky. All these are not conducive for carrying out proper experiments specially on a perennial tree as the coconut palm. In view of the heterogeneity in soil and plant material and the chances of vitiation of the effects of manuring and cultivation by foreign trees and since the staff has no control over any of these things there appears to be no likelihood of the Station actually serving its purpose and we are of the opinion that there is no point in continuing the work at the present site. An alternate area should be selected and a new plantation started and the programme of work as drawn up by the Manurial Trials Sub-Committee of the Indian Central Coconut Committee be undertaken. Proper care regarding age of seedlings, depth of planting, spacing etc., may be taken.

(2) Two experiments (manurial and cultural) were in progress at this station. None of them gave significant results. The yield data may be re-examined on the basis of pre-treatment and post-treatment yields.

(3) Comparison of yields with different treatments has been made for selected trees in the yield group 35-65 nuts per year. The treatment differences were found to be not significant. Only 8 trees out of about 30 numbers in each plot have been taken up for yield comparison. Statistical analysis of yield data may also be made based on different yield groups as well as on post-treatment yields. Care should be taken to eliminate trees in favoured situations and border trees.



(4) In the cultural experiments some significant results are beginning to be recorded. Continuing this in the present form for a few years more to determine whether the same trends will be shown in the subsequent year also would have been desirable.

(5) It has been reported to us that the nursery attached to this Station is doing good work. This work may be continued in the Thodupuzha region.

## 2. *Regional Coconut Research Station, Kumarakom.*

(1) The manurial experiments have been in progress for a considerable period of time and significant differences between control and treated plots have been obtained during 1955 and 1956. The results for 1957 have not been yet examined. This may be done urgently and a detailed report of the results may be prepared and published. Based on the results, a popular note on the manuring of coconut palms in the back water area may be published and effects made to popularise the findings.

(2) It would be desirable also to examine the pre-treatment and post-treatment yields and see if any significant differences between the treatments are in evidence.

(3) The cultural experiments have not given any significant differences between the treatment - cultural treatment except adding clay and sand and slight digging are not practicable on narrow bunds with one row of trees as in this Research Station.

(4) The data summarised for setting percentage are misleading. Setting percentage cannot be more than 100. It would seem that the setting percentage of eight trees have been added together as in the case of yield. This is not correct.

(5) It is noted that this Station which was taken on lease has been now acquired by Government. This is a very desirable feature but it would not be complete unless some area is also reclaimed and fresh planting and new experiments are started. As it is, the existing area which has been under experiments (manurial and cultural) will not be fit for any other experiments for some time

to come. New plantation has therefore to be started as early as possible.

(6) In the newly acquired area there is a block which is in a diseased condition. It would be worthwhile to take up this area for investigation of the disease in the following manner.

- (i) Cut and remove all the badly diseased trees which are beyond the stage of recovery.
- (ii) Assess the remaining trees on (a) degree of disease incidence.
  - (b) age and height – colour of petiole.
  - (c) Yields.
- (iii) Follow a schedule of Soil treatment of NPK + all trace elements over a heavy dressing of cattle manure. Liming may be done to correct the pH.
- (iv) Follow a schedule of plant sanitation and spraying.
  - (b) Take detailed observations of individual trees.

These trees are in single rows on bunds. The inter space between these bunds which is at present a channel, may be reclaimed by forming small mounds. These mounds may be planted with seedlings of selected mother palms obtained from prominent places where the palms are free from the disease. Some of the economic exotic varieties may also be planted. These may be in single rows and the varieties randomised. The inter-spaces may be filled up slowly.

Follow a schedule of manuring and spraying regularly.

When these seedlings grow up the old ones in the existing bunds may be removed and these will form the future channels. In the diseased area near the office building control measures for the root and leaf diseases may be tried on a bulk scale.



In the area to be reclaimed experiments on age of seedlings and method of planting, spacing and manuring etc. as recommended by the Manurial Trials Sub-Committee may be carried out.

(7) Another important item of study to be undertaken is the effect of ebb and flow tide on the movement of soil water if any. For this purpose, level of water at different periods of the day and seasons both in the channels connected to the back water and two or three ponds along in the bunds and not connected to the back water will have to be undertaken.

### 3. *Regional Coconut Research Station, Neyyattinkara.*

(1) The Manurial experiments (6 x 6) are being conducted in an area of about 37 acres having a total of over 2000 trees. Out of these only 288 trees are used for statistical analysis of the yield data. Instead of confining the analysis to a limited number of trees in the plots, it is better to take all the trees for the purpose of analysis since this may give better information. It is for consideration whether it would not be possible to carry out such experiments with a smaller number of trees if the experimental trees are grouped on the basis of pre-treatment yields.

(2) The yields are worked out for trees coming within the yield group of 30 to 100 nuts. There is evidence to show that some of the sterile trees have come to good bearing due to fertilizer treatment. This is very interesting and the material on hand should be examined properly.

(3) The whole yield data have to be examined grouping trees into a unit of 4 to 6 clusters.

(4) There are two young plantations of 4 to 6 years old most adjacent to the present gardens. Steps may be taken to bring these under manurial experiments. Experiments on a modified basis may be carried out in a suitable area and in the young plantations for about 5 years. In the meantime a new site should be acquired and planted afresh and new experiments on the lines suggested by the Manurial Trials Sub-Committee may be started.

(5) This Regional Station should popularise the growing of *Glyricidia maculata* as a green manure bush.

### General.

1. The difficulties of carrying out satisfactory experiments in gardens taken on lease have been overwhelmingly felt in all the three Stations. A real control (without any manuring) could not be provided because the land is a leased out one and there may be competitive manuring of the control. In a manurial experiment, an absolute control is essential in order to have comparative ideas and to explain the responses to treatments in a rational manner. Some progress has therefore necessarily to be made in the matter of acquiring enough area of experiments in the different soil types including the sandy soil of the coastal area. The permanent establishment of Regional Research Stations in Kerala State has now to be reviewed in view of the fact that three Coconut Research Stations of Madras are now in the Kerala State.

2. Since treatment data are available in all the three Stations, the utility of improving the precision of the experiments by covariance analysis should be explored. The results of these should enable the proper laying out of future treatments.

3. It would be desirable to extend the studies in all cases not only to the increase in the number of nuts but also to their copra content.

4. It is said that brown pigmented trees are resistant to root and leaf diseases. It is worthwhile to assess this with the material now on hand in the three Stations.

5. The effect of N. P. K. manurial and the various cultural treatments may also be reviewed in relation to the root and leaf disease conditions of the trees.

6. Another profitable study which could be carried out appears to be the one on the effect of NPK on previously sterile trees.

7. The economics of the manuring and cultural treatments may be worked out and the position examined



as to how far the results can be made practical as far as the grower is concerned.

8. On account of the difficulties experienced, the Thodupuzha Station may be closed down and necessary fresh area acquired for a regional Research Station with similar or identical soil type. This remark does not apply to the nursery attached to the Station which we recommend should be continued.

9. The Kumarakom Station must have a reclamation scheme of at least fifty acres and steps should be taken to develop it into a first class Regional Research Station for coconuts. Experiments now approved by the manurial trial sub-committee should be started at the Station. It would be in the best interest of work, that this station be put in the charge of a fully qualified and experienced Agronomist on whom an overall responsibility of the other two Regional Research Stations could also be placed. We would stress the need to give greater facilities to the workers by way of providing quarters, transport facilities such as providing a motor boat etc. Certain items of equipment such as a rain guage, a pH meter etc. for efficient work at this station would also be very desirable.

10. The Station at Pachallor (Neyyattinkara) may be continued on a restricted scale for five years more. In the meantime necessary new area should be acquired and work started.

11. Lack of proper supervision and direction from time to time is in evidence. It is suggested that the Officer in Technical charge of the Scheme should inspect the station at least thrice in the year. The Agronomist and Statistician of the Indian Central Coconut Committee should also visit the station at least once in the year. If these had been done, some of the items of work and the statistical interpretation could have indeed been improved upon.

12. The staff employed appear to be out of touch with the latest developments in coconut research and also those relating to research on perennial crops. They

should be given more facilities to visit research centres and also attend conferences.

13. The presentation of the annual report of the Regional Research Station is far from satisfactory. They should be standardised.

14. Combining of technical and administrative aspects of the work appear to be desirable particularly to avoid delay in execution of agronomic operations. Certain items which have a direct bearing on the approved technical programme should be attended to by the staff concerned. For example (1) growing of *guinea* grass on sides of bunds to prevent soil wash.

(2) Examination of pigment in relation to disease resistance.

(3) Age and disease incidence etc.

15. Where it may be decided to close a particular Station, the question of the desirability of continuing the observations for studying the residual effects of the treatments done so far, for a short period be considered.

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## APPENDIX VII

### Secretary's Note

*Subject No. 23.* Scheme for the investigation of the "Band" disease of the Coconut Palm in Bombay State—Report of the Plant Physiologist, Central Coconut Research Station, Kayangulam.

The Committee at its last meeting held on 31-1-1958 while considering the progress report on the above mentioned scheme for the year ended 30-6-1957 had decided, on the suggestion of the President of the Committee, that the Plant Physiologist, Central Coconut Research Station, Kayangulam, should inspect on the spot the work done under the scheme and submit a report to the Committee. The Plant Physiologist accordingly visited Bombay in November–December 1958, a copy of



his report on the working of the scheme is attached to this note.

The Plant Physiologist has suggested that the scheme for the investigation of the Band disease of the Areca Palm sanctioned by the Indian Central Arecanut Committee and the scheme sanctioned by this Committee might be consolidated and co-ordinated into a single one as it would be more advantageous and more economical. In his opinion the etiology of the disease can be studied more easily with the areca palm than with the coconut, in case both are one and the same disease.

He has also recommended the lines on which work may be carried out under the scheme.

If, however, the recommendations of the Plant Physiologist are accepted, he has stated that it would be desirable to continue the scheme beyond 14-1-1960 on which date the present sanction for it expires. It may be recalled, in this connection that the Committee at its last meeting had decided that the scheme need not be continued beyond 1960.

The Committee may now decide whether they would accept the recommendations of the Plant Physiologist, Central Coconut Research Station, Kayangulam and if so whether they would agree to the continuance of the scheme beyond 14-1-60.

The subject may be considered first by the Agricultural Research and Development Sub-Committee (Research Wing).

*Investigation of the 'Band' disease of coconut palm in the Bombay State. Brief report of the Plant Physiologist, Central Coconut Research Station, Kayangulam on the working of the Scheme.*

## INTRODUCTION

While considering the progress report of the above scheme for the year ending 30-6-1957 and the revised technical programme, the Coconut Committee (25th Meeting held on 31-1-1958 at Calicut) while approving the progress report felt that there was no need to continue the scheme beyond 1960 and that the new items

of work proposed to be included in the technical programme need not be taken up now. The Committee also decided that the Physiologist, Central Coconut Research Station, Kayangulam should inspect, on the spot, the work done under the scheme and submit a report to the Committee. Accordingly, I visited the laboratory of the Maharashtra Association for the Cultivation of Science at Poona where the investigation (laboratory side) is being conducted and the main regions where the 'Band' disease on arecanut is prevalent. Murud, Srivardan, Mandangad, Dapoli are the main taluks in the Konkan Coast where the disease is prevalent in a mild epidemic form on coconut and arecanut and most of these tracts were inspected by me. I had also discussions about the work with the Director of the M. A. C. S. and Dr. S. G. Joshi, who is in charge of the investigations.

The Director, Central Coconut Research Station, Kayangulam had submitted to the Indian Central Coconut Committee in 1956, a detailed report on his visit to the same 'Band' affected areas of the Konkan Coast and hence particulars regarding history of the disease, climate, soil type, coconut cultivation in the Konkan land etc., are excluded in the present report.

#### *Symptoms of the 'Band' disease of the coconut*

Under this item mention is being made of a few more of the symptoms that I could observe during my tour. One of the earliest symptoms of the 'Band' disease in coconut which is commonly called "Shaya" disease is said to be the development of an intensive green colour in the youngest opened leaf/leaves. However, this symptom is not so very well defined in the case of coconut compared to that of the arecanut. Perhaps this may be subjected to seasonal variations. The more consistent and conspicuous early symptom appears to be the emergence of young leaves having most of their leaflets fused together and becoming incapable of separating into leaflets as in the healthy palms. The size of the newly formed leaves gradually (not abruptly as in arecanut) gets reduced in length, as well as width. The number of leaves as well as leaflets (on a leaf) gets reduced and the



crown looks much thinner. The lamina portion becomes very brittle and the 'pulvinules' of the leaflets are very poorly developed. The leaflets make a deep acute angle with the central peduncle of the leaf. The production of nuts and even spadices of the palm is also affected. To start with, the number of nuts and the female flower production dwindle, followed by diminution of the spadix and reduction in the number of male flowers. In course of time no spadices are produced. Ultimately the crown looks very barren and gives the appearance of the Date palm. As soon as the tree contracts the disease the stem gradually gets thinner, attaining the pencil-point stage in a couple of years. Though 'Band' disease on the coconut is of very recent origin (ten years), still it is possible to come across cases where the trees have either succumbed to the disease or are about to die. The leaflets develop a glabrous texture.

On examining the root system of some of the diseased palms (both coconut and arecanut), a high percentage of their roots was found to be either dead or rotted. Also here and there a few trees were observed to have necrotic symptoms or dry-rot on young leaves, apart from the several cases of rotting or drying of leaves brought about by an earlier attack of the Rhinoceros beetle. Very rare cases of flaccidity of the leaflets of the leaves in the early stages were also observed. One or two trees were showing the drooping of a few green leaves. This symptom is more vivid in the case of arecanut. These are some of the symptoms that are in common with the root (wilt) disease prevalent in Kerala State. The plaited condition of the leaves and the leaflets remaining always acute, and the crown becoming barren soon after the onset of the disease are typical of the coconut disease in the Andhra State. The earliest stage at which 'Band' symptoms are visible on coconut is about five years whereas in arecanut even as young as two-year seedlings manifest the symptoms.

#### *Work in progress*

Almost all the items of the approved technical programme had been started and most of them are in progress. Chemical analysis of the soil collected from



diseased and healthy localities were analysed for N.P.K., Mn. and Cu. Microbiological analysis of soils in estimating the number of bacterial colonies per unit weight of soils, the quantity of  $\text{CO}_2$  evolved per unit weight of soil per unit period of time and the capacity of the soils to produce and accumulate nitrate is in progress. Analysis of tissues from healthy and diseased trees in different regions for copper and manganese has been carried out. Field experiments at Srivardhan, Murdi, Anjarle, Ade and Padale consisting in the application of boric acid, manganese sulphate, copper sulphate, zinc sulphate, mixture of all the four salts and with N. P. K. are in their 3rd year of progress. Pot culture experiment to reproduce the 'band' disease on coconut is in progress at Poona from 1955 onwards. Preliminary survey work is also reported to have been undertaken in Kolaba and Ratnagiri districts.

#### *Importance of investigation*

In the Bombay State, Ratnagiri and Kolaba are the main coconut producing districts. A very conspicuous area comprising the southern part of the Kolaba district and the northern part of the Ratnagiri district is affected by the 'band' disease. Though this disease is only of ten-year standing in coconut, it has spread to an area of about 500 acres within such a short period. Apart from the loss sustained by this strip of diseased area, there is the fear of this disease spreading southwards to the southern parts of Ratnagiri district, from there to Mysore State and ultimately to Kerala. Therefore, in the best interest of the coconut and arecanut industries, it is highly necessary to intensify investigations in diagnosing and curing this peculiar and spreading disease.

#### *Some special features of the disease*

Chemical analysis of a number of samples of soils under the healthy and 'band' affected coconut palms collected from different localities for N. P. K., Mn. and Cu. was made. But no significant difference in the figures of analysis for soils both for macro as well as micronutrients from the healthy and diseased tracts was observed. Analysis of leaf samples for Cu. and Zn. also



has shown that there is no deficiency of these micro-nutrients in the plant tissue. In spite of this, 'band' affected coconut palms respond favourably to the application of copper and zinc. I also lay emphasis on expanding this item of work and repeating it several times for proper understanding of this interesting point. However, with regard to the study on the microbiological analysis of soils it was found that the microbiological activities of carbon dioxide, bacterial numbers and the rate of nitrification appear in general, to be higher in the soils collected under healthy trees than that from the 'band' affected trees. This of course requires to be confirmed by more analyses. Under these circumstances it will be rather hasty to attribute the deficiency of certain macro or micronutrients to be the cause of 'band' disease. It will take at least a couple of years more to consider the result of field experiments with micronutrients on coconut palms.

*Possible relationship of the 'Band' on coconut & arecanut.*

The 'band' disease of arecanut has been in existence in the Konkan land for about 80 years. Earlier investigators felt that the disease had something to do with the soil conditions and that fungi or pests have very little role in this. The first symptom of the disease is the abrupt production of a leaf very much reduced in size than the older one. Subsequent younger leaves become still smaller and these young leaves assume a dark green colour as against the light green colour of the normal ones. The internodes on the stem become narrower and narrower and the stem assumes the pencil-point condition. Yield of the palm abruptly gets reduced, the crown becomes barren of flower production and hence the disease is called the 'band' or barren disease. When once the tree contracts the disease, it usually dies within three to eight years. The infection appears to range from 0-20 per cent in the various localities of the disease belt and this is responsible for heavy losses of arecanut which is the principal crop plant of the Konkan tracts. Assuming this to be a disease caused by the deficiency of nutrients, an experiment under the Agricultural Chemist, Bombay State



consisting of the application of both N. P. K. and micro-nutrients, principally copper, zinc and boron, was started. While in general, the application of copper sulphate has given encouraging results, the continued application of the same has caused the recurrence of the disease symptoms in some cases. Also erratic as well as favourable results were obtained with the other micro-nutrients as well as with N. P. K. Application of sulphur (by some private cultivators) has also resulted in favourable response.

Since some of the coconut trees in these tracts where 'band' disease on arecanut is prevalent, recently show somewhat similar disease symptoms and react almost similarly with nutrients as that of arecanuts, the disease on coconut is also termed 'band' disease. It is also presumed that the 'band' disease on coconut has spread from the areca palm. The 'band' disease on coconut is not reported to be prevalent in any tract other than where the arecanut 'band' is also present. Since coconut and arecanut are close members of the palm family showing almost similar growth preferences, it will be of great importance if the investigations of the 'band' disease of both the coconut and arecanut are amalgamated. Arecanut will serve as a very good plant for pot culture experiment, alternate host and allied studies. Arecanut is expected to respond to treatments much easily and quickly than the coconut. Since both the Coconut and the Arecanut Committees are under the same administration (I. C. A. R.) it is presumed there may not be much difficulty in this amalgamation.

*The pot culture experiment on coconut.*

At present coconut seedlings have been planted in proportionately very small pots and attempts are made to produce the 'band' disease symptoms on the seedlings by withdrawing certain micronutrients (Cu, Zn & B). This experiment is conducted at Poona. Unless the size and number of the containers is considerably increased and uniform planting material is used (if possible green dwarf seedlings) there is no full justification in running the experiment. Arecanut seedlings will be more ideal for such experiments than coconut. Since



Poona is not an ideal place for coconut or arecanut (on account of the severe winter) it is highly desirable to shift this experiment to the Konkan Coast, provided additional staff facilities are granted.

*Handicaps of the research workers.*

The 'band' disease scheme of the Coconut Committee comprises principally of one technical hand (the Agricultural Officer). For want of good laboratory facilities in the disease belt, most of the items of the programme are carried out at Poona itself at the M. A. C. S. laboratory. Since the disease tract is practically cut away from Poona during the monsoon for about four or five months every year due to want of shipping facilities, the Agricultural Officer is unable to have any information from the disease tracts during monsoon. The Agricultural Officer is single-handed and he cannot attend to the items of work both at Poona and at the diseased tracts simultaneously. It will be therefore essential to grant some additional staff for the scheme, so that, one unit can be permanently stationed in the diseased tract, while the Agricultural Officer can be stationed at Poona for the major part of the year.

Though the etiology of the disease has not yet been studied in detail, curative trials are being conducted in several villages. It will be better if such curative trials are restricted to one locality where other pathological and physiological investigations can be conducted. When some positive indications are felt regarding the etiology of the disease, curative trials can be extended to other parts of the disease belt.

*Summary of recommendations.*

1. The 'band' disease of the coconut and areca palms prevalent in the Kolaba and Ratnagiri districts of Bombay State is steadily though gradually spreading and getting intensified. Before it is allowed to assume epidemic proportions it is highly desirable to fortify the research unit working on this problem and to find out an effective control measure as early as possible. If neglected, there is the fear of this disease spreading

southwards from Ratnagiri district to the Mysore and Kerala States.

2. There are two separate schemes sanctioned by both the Indian Central Coconut Committee as well as the Indian Central Arecanut Committee for the investigation of 'band' disease on coconut and areca palms respectively. Since both the palms are closely related and since the 'band' on coconut is presumed to be the same as that of the areca palm, it will be advantageous and economical to consolidate and co-ordinate the schemes into a common one. In my opinion, the etiology of the disease can be studied more easily with the areca palm than with the coconut, in case both are one and the same disease. Areca palm responds to treatments in a much shorter period.

3. On account of a few fresh symptoms appearing (though in limited cases) on coconut, it will be highly desirable to start investigations on the pathological/virological aspects also in addition to the present line of investigation. For this purpose, transmission trials, histopathological studies and the search for pathogens, micro-organisms etc. will have to be undertaken. I feel the earlier negative results need not be a bar for such studies.

4. Since the disease belt (in the Konkan coast) is not easily approachable, particularly during the monsoon, it may be necessary to keep one responsible research worker stationed permanently in the disease tract itself. He will be able to make the pathological and minor laboratory tests in addition to his attending to the field experiments and recording of the progress of the treated palms during the different seasons of the year.

5. Since the etiology of the disease is not yet studied, it may be sufficient to restrict the curative field trials to one or two typical centres only, preferably in Murdi. This will enable the worker to concentrate on the etiology of the disease.

6. The pot culture experiment conducted at Poona requires major changes. The size of the containers and their number have to be increased. It will be desirable



to shift the pot culture experiment to the disease belt itself. If not, at least a similar experiment may be started at Murdi. Apart from coconut, it may be necessary to try areca palms for pot culture experiments to obtain quicker results. Areca seedlings, being smaller and quick-growing, may come up better even in smaller containers. If required, even 'band' affected areca seedlings may be obtained locally for pot culture studies.

7. Since the application of certain micronutrients (Cu, Zn, Mg and B) has given favourable responses (though sometimes erratic), this item of work may be expanded and repeated. The enzymatic studies (chromatographic) in progress at Poona are also expected to yield good results. These may be intensified.

8. Since most of the gardens (both coconut and arecanut) are overcrowded and receive excess irrigation, the importance of proper spacing and providing proper drainage may be emphasised to the cultivators. Excess shading and high humidity may aggravate disease conditions even if they are not the causal factors. General manuring and increasing the fertility (both macro and micro) of the gardens may also be emphasised. It may be desirable to have a model plot selected in a private garden to demonstrate the scientific methods of cultivation.

9. Application of sulphur has been found to do good to the 'band' affected areca palms in some cases. This aspect requires further studies.

10. Foliar spraying of nutrients may be tried or the nutrients may be injected through cut ends of roots. Liquid injection methods were demonstrated at Murdi village.

11. Studies on the root rotting and on the root exudations may yield interesting results. Methods of collection of root exudation, sap transfusion, etc. were also demonstrated.

If the Committee is agreeable to the above suggestions and prepared to continue the scheme beyond 1960, details regarding the essential additional staff requirements will be worked out and submitted immediately.

I desire to thank Prof. S. P. Agharkar, Director, M. A. C. S. and Drs. S. G. Joshi and S. G. Kulkarni, Officers in charge of 'band' disease schemes on coconut and arecanut respectively for the valuable discussions I had with them and for the help received during the course of my visit to Poona and the Konkan coast.

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## APPENDIX VIII

### Secretary's Note

*Subject No. 25.* Coconut Fertiliser Demonstration Scheme – Proposal for the Indian Central Coconut Committee to take over certain demonstration fields.

The Indian Central Coconut Committee at its 24th meeting (February 1957) had considered the question of taking over certain demonstration fields under the Coconut Fertiliser Demonstration Scheme of Messrs. Potascheme and Parry and Company, Limited, and decided that 50 selected plots might be taken over by the Committee after 1960 and that fresh manurial trials at 2 or 3 levels under different soil conditions be laid out on the cultivators' holdings. The Committee had also set up a Special Sub-Committee consisting of Dr. V. G. Panse, Dr. R. J. Kalamkar, Shri C. M. John, Dr. K. M. Pandalai and Dr. J. A. Daji to work out the full details of the scheme for laying out manurial trials in cultivators' holdings. (Vide Subject No. 44 of the proceedings of the 24th meeting).

The Special Sub-Committee met at Hyderabad in October 1957 and recommended that while a few promising plots under the Coconut Fertiliser Demonstration Scheme might be taken over by the Committee, more stress should be laid on the laying out of simple manurial trials in cultivators' fields. The Indian Central Coconut Committee at its last meeting (January 1958) considered the Special Sub-Committee's recommendations and felt that manurial demonstrations, as suggested by the Special



Sub-Committee, would not be practicable or feasible and decided that such demonstrations need not be undertaken (Vide Subject number 13 of the proceedings of the 25th meeting).

In connection with the taking over of a few plots under the Coconut Fertiliser Demonstration Scheme, the Director, Central Coconut Research Station, Kayangulam, has inspected along with the representatives of Messrs. Potascheme and Parry and Company, Limited, the fields at the Irinjalakuda, Parur, Changanacherry, Shertallai, Mavelikara, Nagercoil and Kottayam centres. He has selected 12 fields for being taken over by the Committee. A note regarding these fields, the organisational set up contemplated for running the plots and the financial implications forwarded by him is attached.

The scheme is proposed to be run for a period of 5 years at a total cost of Rs. 12,500/-. The work in the fields at Irinjalakuda, Parur, Changanacherry and Nagercoil is proposed to be entrusted to the Coconut Nursery Assistants in those places. The fields at Mavelikara and Shertallai will be supervised by the staff of the Central Coconut Research Station, Kayangulam and that at Kottayam by the staff of the Regional Coconut Research Station, Kumarakom.

The Committee may now decide whether the proposal of the Director, Central Coconut Research Station, Kayangulam may be accepted.

The subject may be considered first by the Agricultural Research and Development Sub-Committee (Research Wing).

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*Coconut Fertiliser Demonstration Scheme – Proposal for the Indian Central Coconut Committee to take over certain demonstration fields. •*

*Introduction.*

In order to popularise the use of NPK fertilisers for coconut on the West Coast of India a demonstration scheme sponsored by M/s. Parry & Co. and Potascheme

was started in 1951 with the approval of the Committee. Starting from Badagara in the North to Cape Comorin in the South 170 fields with about 20,000 trees in them were given manures according to the scheduled dose of NPK and kept under observation. Every year the work done under this scheme is reviewed at a joint meeting of the representatives of the firms and the officers of the Committee. At a meeting held in Madras in July 1956 it was suggested that since most of the fields under these trials have shown good response to the application of fertilisers, the Indian Central Coconut Committee might take over some selected fields on the termination of the scheme in 1960, in order to continue the observations. This suggestion was placed before the Committee at its 24th meeting and it was decided that 50 selected plots run by the Potascheme may be taken over by the Committee after 1960.

The representative of M/s. Potascheme and the Director, Central Coconut Research Station, Kayangulam, met again to implement the Committee's decision. Many of the demonstration fields in the centres of Irinjalakuda, Parur, Changanacherry, Shertallai, Mavelikara, Nagercoil and Kottayam were inspected by the Director, Central Coconut Research Station, Kayangulam and representatives of M/s. Potascheme and Parry & Co. Twelve fields from seven centres as per details given below were selected for being taken over by the Committee in 1960.

		No. of trees to be manured (B)	Control (A)
<i>Centre - Irinjalakuda</i>			
Field No.	11	38	39
	17	46	40
<i>Centre - Parur</i>			
Field No.	11	43	36
	17	78	49
<i>Centre - Changanacherry</i>			
Field No.	11	46	46
	16	57	41
<i>Centre - Shertallai</i>			
Field No.	8	44	39



<i>Centre - Mavelikara</i>		
Field No.	19	91
<i>Centre - Nagercoil</i>		
Field No.	2	58
"	10	54
"	13	44
<i>Centre - Kottayam</i>		
Field No.	5	90
	<u>689</u>	<u>47</u>
		<u>573</u>

### *Duration and organisation.*

The Scheme is to run for a period of five years from 1960. In all about 700 trees are to be manured and about 600 kept as controls. The fertilisers are to be supplied free of cost to the owners of the selected gardens. Cost of manuring, cultivation and green manuring will have to be met by the owners. Bulk harvest records are to be maintained separately for the A and B plots by the owners who would be supplied with harvest registers. It is proposed mainly to entrust the supervision of the harvests, cultural and manurial operations with the Coconut Nursery Assistants. Thus the fields at Irinjalakuda, Parur, Changanacherry and Nagercoil would be under the supervision of the Coconut Nursery Assistants at Irinjalakuda, Parur, Paippad and Nagercoil respectively. The fields at Mavelikara and Shertallai would be supervised by the staff of the Central Coconut Research Station, Kayangulam and Field No.5., Kottayam by the staff of the Regional Coconut Research Station, Kumarakom. Many of the fields selected are in the diseased area and it is considered desirable to keep a watch on the incidence of disease in relation to manuring. Periodical assessment of pest/disease incidence will be made by the staff of the Central Coconut Research Station, Kayangulam.

### *Finance.*

Cost of manuring 700 trees at	
Rs. 2.50 per tree	1,750.00
Provision of extra T. A. for	
the supervisory staff	750.00
Total	<u>2,500.00</u>
Total for 5 years	<u>12,500.00</u>

Registers for the recording of observations will be supplied free by the Potascheme. The proforma of the registers will be finalised in consultation with the Director, Central Coconut Research Station, Kayangulam.

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APPENDIX IX  
Secretary's Note  
*New Scheme*

*Subject No. 26.*

1. Name of the scheme: Scheme for the survey of coconut pests and diseases in *West Bengal*.
2. Location: *Chandernagore*:
3. Object of the Scheme: To conduct a survey of the pests and diseases of the coconut palm and collect data on the nature of the pests and diseases, the extent and severity of their incidence, seasonal outbreaks etc.
4. Duration of the scheme: Two years.
5. Cost of the scheme:  
(Vide statement attached)
  - a) *Expenditure*:
    - i) Recurring Rs. 32,608
    - ii) Non-recurring Nil
    - iii) Committee's share Rs. 32,608
    - iv) State Government's share Nil
  - b) Receipts Nil
  - c) Net Cost Rs. 32,608 for 2 years.
6. Remarks of the Secretariat on the scheme (1) Along with the survey of pests and diseases the West Bengal Government had originally proposed to undertake



investigations on the pests and diseases and also the training of cultivators' sons in coconut palm protection work. The Director, Central Coconut Research Station, Kayangulam, however, suggested that a survey might be conducted first to collect data on the nature of the pests and diseases, the extent and nature of their incidence, seasonal outbreaks etc. This data, according to him, was necessary for planning the investigations on proper lines and to determine the nature of the training to be given to the cultivators' sons. The present proposal is framed according to the Director's suggestion.

(2) The survey is proposed to be undertaken by the Coconut Development Officer, West Bengal, with the help of additional staff consisting of 2 Research Assistants, 2 Fieldmen, and 2 Laboratory Attendants. The pay of the staff during the second year is shown in the statement of cost as Rs. 5,040, Rs. 1,392, and Rs. 744 whereas it works out to Rs. 4,920, Rs. 1,334 and Rs. 720 respectively. The total cost of the scheme will, therefore, be only Rs. 32,416.

(3) The State Government has requested that the entire expenditure on the scheme may be met by the Committee. As the recurring expenditure has to be shared equally by the

State Government and the Committee according to the "General Conditions applicable to Grants made by the Indian Central Coconut Committee", the scheme may be sanctioned subject to this condition.

The subject may be considered first by the Agricultural Research and Development Sub-Committee (Research Wing).

Copy of letter No. 8051-Agri. / 5A-192/57 dated 5-7-1958 from Assistant Secretary to the Government of West Bengal, Agriculture, Animal Husbandry & Forests Department, Agriculture Branch, Calcutta to the Secretary, Indian Central Coconut Committee, Ernakulam.

*Subject:* Scheme for the survey of diseases and pests of Coconut in West Bengal.

I am directed to refer to your letter No. F.9 (22)/57 dated 23-5-1958 on the subject mentioned above and to enclose herewith, as desired therein, a statement showing details of estimated expenditure relating to the pay, allowances etc., of the additional staff required for the survey in question.

	1st Year	2nd Year
I Two Research Assistants in the scale of Rs. 150-5-240-10-300/- with an initial salary of Rs. 200/- p.m. (1 R. A. Mycology and 1 R. A. Entomology) 200 x 2 x 12	Rs. 4,800.00	5,040.00
II Two Fieldmen in the scale of Rs. 50-1-68-2-80/- with an initial salary of Rs. 55 per month (1 F.M. for Mycology and 1 F.M. for Entomology) 55 x 2 x 12	Rs. 1,320.00	1,392.00



III Two Laboratory Attendants in the scale of Rs. 20-1/2- 35-1-45/- 2 x 30 x 12	Rs. 720.00	744.00
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*Allowances and Honoraria:*

(IV) Dearness Allowances, House allowances, compensatory allowances etc. for 2 R.A's, 2 F.M.'s and 2 L.A's.	Rs. 4,224.00	4,368.00
(V) Travelling allowances	Rs. 3,000.00	3,000.00
(VI) Contingencies	Rs. 2,000.00	2,000.00
	Rs. 16,064.00	16,544.00

## APPENDIX X

### Secretary's Note

*Subject No. 28.* Increasing the production of coconut seedlings – proceedings of the Special Sub-Committee for.

The Indian Central Coconut Committee had at its last meeting held in January 1958, considered the question of increasing the production of coconut seedlings in the coconut nurseries and had, on the suggestion of the President of the Committee, constituted a Special Sub-Committee, consisting of the following members to go into the question of increasing the output of seedlings and allied matters for stepping up coconut production:-

1. Dr. S. Krishnamurthi.
2. Shri C. M. John.
3. Dr. K. P. V. Menon.
4. The Director of Agriculture, Kerala State.
5. The Director of Agriculture, Mysore State.
6. The Director of Agriculture, Madras State.
7. The Under Secretary to the Government of India dealing with Commodity Committee matters and
8. Dr. P. J. Gregory, Secretary, Indian Central Coconut Committee.

A meeting of the Special Sub-Committee was held in the office of the Director of Agriculture, Madras, on 25-6-1958 under the chairmanship of Shri C. M. John. A copy of the proceedings of the meeting along with a copy of my note circulated among the members of the Sub-Committee is attached to this note. The recommendations of the Special Sub-Committee and the action taken thereon are indicated below.

*Recommendation No. 1.*

That a booklet containing instructions regarding selection of gardens for marking mother palms, selection of mother palms etc., be prepared by the Committee in consultation with the Oil Seeds Specialist, Coimbatore, and printed copies of the booklet supplied to the nursery officers.

*Action taken*

The booklet is being prepared by the Joint Director, Central Coconut Research Station, Kasaragod.

*Recommendation No. 2.*

That a detailed note dealing with the various aspects of under-planting and new planting be prepared by the Committee and published in the regional languages and that copies of it be supplied to all nursery officers.

*Action taken.*

The detailed note is being prepared by the Joint Director, Central Coconut Research Station, Kasaragod.

*Recommendation No. 3.*

That the National Extension Service nurseries in Kerala State both existing and future be located in proper places, that the Development Commissioner be requested to consult the Director of Agriculture, Kerala in the selection of the blocks for starting the nurseries and that the remaining National Extension Service nurseries be started as early as possible.

*Action taken.*

The Development Commissioner, Kerala who was informed of the Sub-Committee's decision has stated



that 20 National Extension Service Nurseries will function in 1958-'59 and that their location has been fixed in consultation with the Director of Agriculture, Kerala.

*Recommendation No. 4.*

That, in the case of new nursery schemes, sufficient provision be made for adequate irrigation facilities, that the Committee share the expenditure in this connection even though it might be an item of non-recurring expenditure and that the question of providing irrigation facilities be examined by the Committee in regard to the existing nurseries as well.

*Action taken*

The State Government have been requested to forward detailed proposals, if necessary, for providing irrigation facilities in existing nurseries, in case they are experiencing difficulty in reaching the targets fixed for those nurseries for want of adequate irrigation facilities. The proposals are still awaited.

*Recommendation No. 5*

That the need for adequate underplanting and new planting be pointed out to the State Governments, that they be requested to forward proposals, if necessary, for increasing the output of the existing nurseries and that in case there were special areas where nurseries were not in existence, proposals for establishing registered nurseries be called for.

*Action taken*

The State Governments have been requested to forward proposals for producing additional number of seedlings to meet the requirements of underplanting and new planting. The proposals from all the States, except Pondicherry, are still awaited.

A statement showing the location of the existing coconut nurseries in the different States, their annual production target and achievements during the last three years is attached to this note.

*Recommendation No. 6*

That a general survey of the vacant sandy area near Trivandrum be conducted to find out its suitability for coconut cultivation.

*Action taken*

The survey has been done by the staff of the Kerala Department of Agriculture and a scheme for planting 500 acres immediately and 10,000 acres eventually, submitted by the Kerala Government to the Government of India.

*Recommendation No. 7*

That the Andhra Pradesh Government be requested to establish coconut nurseries in National Extension Service Blocks at Mahboobnagar, Warangal and Karimnagar and the Government Farm at Himayatsagar.

*Action taken*

The proposals of the Andhra Pradesh Government to whom the Sub-Committee's decision was communicated are still awaited.

*Recommendation No. 8*

That a sub-nursery of the coconut nursery at Kasaragod be set up near about Kasaragod with an annual production target of 30,000 seedlings.

*Action taken*

Detailed proposals for the purpose were considered by the Finance Sub-Committee of the Committee at its meeting held on 22-9-'58 but in view of certain practical difficulties pointed out by the Joint Director, Central Coconut Research Station, Kasaragod, it was decided that the proposal might be deferred for the present.

The Committee may now approve of the recommendations of the special Sub-Committee and decide whether they would, as a special case, agree to share, in the usual proportion the expenditure on the provision of irrigation facilities in the coconut nurseries although, according to the general conditions applicable to grants made by the Committee, the entire non-recurring expenditure has to be met by the State Government concerned. Detailed proposals from the State Governments in this regard



will be put up to the Committee for sanction as and when they are received.

The subject may be considered first by the Agricultural Research and Development Sub-Committee (Development Wing).

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Proceedings of the meeting of the Special Sub-Committee for considering the question of increasing the production of coconut seedlings held in the Office of the Director of Agriculture, Madras, at 11 A. M. on Wednesday the 25th June 1958.

The following members were present:—

1. Shri R. D. Thawani, Under Secretary to the Government of India, Ministry of Food & Agriculture, New Delhi.
2. Shri P. D. Nair, Director of Agriculture, Kerala.
3. Shri A. Venkatesan, Director of Agriculture, Madras.
4. Shri D.P. Lakshminarasimhiah, Senior Assistant Botanist, Bangalore.
5. Shri C. M. John.
6. Dr. P. J. Gregory.

Shri C. R. Seshadri, Joint Director of Agriculture, Madras, also attended the meeting.

Dr. S. Krishnamurthy and Dr. K. P.V. Menon had intimated their inability to attend the meeting.

Shri C. M. John was elected to take the Chair.

In opening the proceedings, Shri C. M. John stated that the Sub-Committee had before it a comprehensive note on the output of coconut seedlings in the various States as well as the estimates of seedlings required for underplanting and new planting during the remaining period of the Second Five-Year Plan. He pointed out that according to the estimates a very large number of seedlings were required for underplanting and new planting and that the position would have to be analysed properly before making a recommendation in the matter. He

requested the members to analyse the position and to suggest ways and means for implementing the idea in a practical manner.

Dr. P. J. Gregory suggested that the requirement of seedlings for underplanting might be estimated at one per cent of the existing palms, or in other words, at the rate of  $1\frac{1}{2}$  seedlings for an acre would be a reasonable estimate. As regards the extent of new area to be brought under coconut, he suggested 1,000 acres for Kerala, 3,000 acres for Mysore, 2,000 for Madras, 4,000 for Andhra, 1,000 for Bombay, 2,000 each for West Bengal and Orissa, and 1,000 for Assam.

Shri P. D. Nair suggested that a survey might be undertaken before the Sub-Committee could make a recommendation regarding the requirement of seedlings for underplanting.

The Chairman pointed out that details regarding the requirements of seedlings for underplanting and new planting should be available with the nursery officers as the collection of that information was part of their duties.

Shri P. D. Nair observed that in the nurseries run by the Department of Agriculture, Kerala State, no registers were being maintained by the Nursery Officers to collect information regarding the growers' requirements of seedlings for underplanting etc. He, therefore, suggested that the Coconut Committee might issue a pamphlet containing instructions to Nursery Officers.

Dr. Gregory pointed out that it would be quite desirable to draw up a list of instructions for nursery officers to follow.

The Sub-Committee thereupon decided to recommend that a booklet containing instructions regarding (1) selection of gardens for marking mother palms, (2) selection of mother palms (3) selection of seednuts, (4) sowing of seednuts, (5) selection of seedlings (6) maintenance of registers, etc., and (7) other items of work the Nursery Officers are expected to do, might be prepared by the Technical staff of the Coconut Committee in consultation with the Oilseeds Specialist, Coimbatore, and



printed copies of the booklet might be supplied to the Nursery Officers.

The Chairman also suggested that a detailed note dealing with the various aspects of underplanting and new planting might be prepared by the Coconut Committee and published in the regional languages and copies supplied to all the nursery officers so that a copy of the pamphlet might be supplied along with each supply of coconut seedlings.

The suggestion was accepted for recommendation by the Sub-Committee.

In reply to a query from Dr. Gregory, regarding the starting of the remaining 40 nurseries in the National Extension Service Blocks in Kerala, Shri P.D.Nair expressed the view that he was certainly in favour of establishing small nurseries in the National Extension Service Blocks as that would solve the transport problem considerably. But he expressed the view that the location of the nurseries should be decided by the Director of Agriculture with due regard to the requirements of the locality.

The Sub-Committee decided to recommend that with regard to the National Extension Service nurseries in Kerala — both existing and proposed ones — it was essential that they should be located in proper places, and that it would be a good procedure if the Development Commissioner consulted the Director of Agriculture in the selection of the Blocks for starting nurseries.

The Sub-Committee also decided to recommend that the remaining National Extension Service nurseries in Kerala should be started as early as possible.

Shri. P. D Nair said that the production of seedlings in the existing nurseries in Kerala could be improved both quantitatively and qualitatively if adequate watering facilities could be provided in the nurseries. He also said that a scheme for the purpose had been forwarded to the Coconut Committee.

Dr. Gregory pointed out that the Committee might agree to offer financial assistance with regard to the nurseries financed jointly by the Committee and the

State Government, that the expenditure relating to the nurseries being run departmentally might be met from the State funds and that the Government of India had suggested that a detailed scheme relating to the Second Plan nurseries might be forwarded to them for sanction in case the expenditure could be met from the amount allotted to the State by the Government of India for 1958-59.

Shri P. D. Nair pointed out that it was difficult for his Government to find the required funds and that if the Government of India or the Coconut Committee could provide the funds, the target of production of the nurseries could be enhanced.

Shri R. D. Thawani said that it might be possible for the State Governments to find the required funds by diversion from other schemes in the same group of schemes included in the State Plans.

The Sub-Committee decided to recommend that in the case of new nursery schemes adequate funds should be provided for meeting the expenditure involved, in affording adequate irrigation facilities and that the Coconut Committee might share that item of expenditure also even though it might be an item of non-recurring expenditure.

The Sub-Committee also recommended that the question of providing irrigation facilities should be examined by the Coconut Committee in regard to the existing nurseries as well.

The Sub-Committee considered at length the requirements of seedlings for underplanting and new planting and felt that one per cent of the existing trees might be estimated as underplanting requirements with such modifications as deemed necessary by the individual State and that the extent of new area to be planted might be estimated at 3,000 acres each in Kerala and Mysore, 2,000 acres in Madras, 4,000 acres in Andhra Pradesh, 1,000 acres each in Bombay, West Bengal and Orissa and 500 acres each in Assam and the Andamans. The Sub-Committee also recommended that the average



requirement of seedlings for new planting might be taken as 60 per acre. A statement showing the requirements of seedlings for underplanting and new planting based on the recommendations of the Sub-Committee is attached.

The Sub-Committee was, however, of the view that the requirements of seedlings for underplanting and new planting in the different States could be better estimated from the indents placed by the growers for seedlings in previous years, and that for increasing the production of seedlings, the target of the existing nurseries might be increased as far as possible.

Shri P. D. Nair said that there were limitations for increasing the target of production of the existing nurseries and that therefore registered coconut nurseries under private nurserymen might be started as in the case of the registered arecanut nurseries functioning under the Arecanut Committee. He suggested that the Coconut Committee might arrange to supply the seednuts to the private nurserymen and collect the actual cost from them. The Coconut Committee might also compensate the private nurserymen for the losses involved in the rejection of seednuts and seedlings. He also suggested that the Committee should see that the private nurserymen get a reasonable profit.

Shri A. Venkatesan supported the view of Shri P.D. Nair and suggested that the case of each private nurseryman might be considered on its own merits.

The Sub-Committee recommended that the Coconut Committee might point out to the State Governments the need for adequate underplanting and new planting and request them to forward proposals, if necessary, for increasing the output of existing nurseries, and in case there were special areas where nurseries were not in existence, proposals for establishing registered nurseries might be forwarded.

Shri P. D. Nair said that he had requested the Coconut Committee to send one of their technical persons to inspect a vast area of vacant land near Trivandrum with a view to find out whether the land was suitable for coconut cultivation, but that it had not been done.

Dr. Gregory pointed out the views of the Director, Central Coconut Research Station, Kayangulam, that a period of about 6 months and a special staff would be required to conduct a detailed survey of the area and that the work could more appropriately be undertaken by the staff at the Agricultural College, Vellayani.

Shri P. D. Nair said that he only wanted an experienced technical person to visit the area and make a preliminary report regarding the suitability of the land for coconut cultivation, and that there were no suitable officers in his Department for the purpose.

The Sub-Committee recommended that a general survey of the land might be arranged to be undertaken by the Coconut Committee and that the matter should be given priority.

Shri P. D. Nair then expressed the view that there was considerable scope for increasing the area under coconut in the Hyderabad area of Andhra Pradesh and suggested that coconut nurseries might be established in the National Extension Service Blocks at Mahboobnagar, Warrangal and Karimnagar and in the Government Farm at Himayatsagar.

The Sub-Committee recommended that the Andhra Pradesh Government might be requested to establish coconut nurseries in the above places.

Dr. Gregory pointed out that the President of the Committee had been insisting that the target of production of the coconut nursery at the Central Coconut Research Station, Kasaragod, might be increased, but that it could not be done due to difficulty in getting additional seednuts from the farm of the Research Station. He said that a large number of seed coconuts will become available from the scheme for supplying seed coconuts to the States and that a sub-nursery was proposed to be set up at Badagara with an annual production target of 30,000 seedlings with those seednuts.

The Sub-Committee recommended that the above proposal might be accepted.

With a vote of thanks to the Chair, the meeting came to a close at 1.45 P. M.



# Statement showing the requirements of coconut seedlings in the different States for new planting and underplanting per annum.

State.	Area under coconut (in 1000 acres).	Seedlings required for underplanting (at 1% per annum).	Extent of new area to be planted for 3 years (acres).	Extent of new area to be planted per annum (acres).	Seedlings required for new planting per annum (at 60 per acre).	Total No. of seedlings required for underplanting and new planting per annum. (total of 3 and 6).	Production target of existing nurseries.	Additional production required per annum.
Kerala	1,098	6,58,800	3,000	1,000	60,000	7,18,800	4,59,500*	2,59,300
Mysore	215	1,29,000	3,000	1,000	60,000	1,89,000	41,000	1,48,000
Madras	129	77,400	2,000	667	40,000	1,17,400	1,26,000	Nil
Andhra	84	50,400	4,000	1,333	80,000	1,30,400	1,87,500**	Nil
Bombay	20	12,000	1,000	333	20,000	32,000	15,000	17,000
West Bengal	17	10,200	1,000	333	20,000	30,200	43,000	Nil
Orissa	11	6,600	1,000	333	20,000	26,600	23,000	3,600
Andamans	4	2,400	500	167	10,000	12,400	—	12,400
Assam	2	1,200	500	167	10,000	11,200	17,000	Nil
Pondicherry	2	1,200	—	—	—	1,200	6,000	Nil
Total:	1,582	9,49,200	16,000	5,333	3,20,000	12,69,200	9,18,000	4,40,300

\*This includes 2,50,000 seedlings proposed to be raised in 50 nurseries sanctioned to be started in the National Extension Service Blocks in Kerala.

\*\*This estimate is based on the revised scheme forwarded by the Andhra Government to the Government of India for sanction under the Second Five-Year Plan.

*Sub:- Increasing the output of coconut seedlings.*

At its last meeting held in January 1958, when the Indian Central Coconut Committee was considering the question of doubling the production of coconut seedlings in existing nurseries, the Assistant Agricultural Commissioner with the Government of India, who also attended the meeting, had observed that one of the most essential things required to maintain the present area of coconut trees under proper production was to underplant in the existing plantations at least 3 seedlings per acre per annum on an average to replace old and uneconomic palms and that on this basis about 45 lakhs of seedlings per year would be required for this purpose alone for the country as a whole. The Assistant Agricultural Commissioner also pointed out that it was necessary to plant up additional areas every year so that from the IV Plan period onwards the palms so planted may start to yield. He estimated that even if only 25,000 acres were planted with coconut seedlings, during the next three years, (the last three years of the II Five-Year Plan), the total number of seedlings required would be of the order of 15 lakhs or 5 lakhs per annum. Thus altogether the total annual production of seedlings would have to be 50 lakhs (as against the present target of about 10 lakhs of seedlings) involving a cost of Rs. 50 lakhs for the next 3 years. The Assistant Agricultural Commissioner said that it would be difficult to find such a huge amount and suggested that the whole position would have to be reviewed properly and a realistic scheme drawn up to face the situation.

The President of the Committee thereupon stated that the whole matter of planning for the II Five-Year Plan in the matter of increasing the acreage and production of coconut had not received proper attention and that it required careful study. He suggested that a Special Sub-Committee be constituted to go into the question of increasing the output of seedlings and allied matters for stepping up coconut production. The Committee accepted the suggestion and the present Special Sub-Committee consisting of the following was accordingly constituted:-



- 1) Dr. S. Krishnamurthy, Assistant Agricultural Commissioner with the Government of India.
- 2) Shri C. M. John.
- 3) Dr. K. P. V. Menon.
- 4) The Director of Agriculture, Kerala.
- 5) The Director of Agriculture, Mysore.
- 6) The Director of Agriculture, Madras.
- 7) The Under Secretary to the Government of India dealing with Commodity Committee matters.
- 8) Dr. P. J. Gregory, Secretary, Indian Central Coconut Committee.

With a view to enable the Special Sub-Committee to draw up suitable schemes for increasing the output of seedlings in the different States, the Governments of the coconut-growing States were requested to furnish realistic estimates of their requirements of seedlings for underplanting in existing gardens and for planting in new areas during the remaining 3 years of the Second Five-Year Plan. These estimates have been furnished so far by the Governments of Madras, Mysore, Bombay and Pondicherry only and they are given below along with the target of production of the existing nurseries:-

State.	No. of seedlings required for		Production target of existing nurseries.	Additional production required.
	Underplanting.	New planting.		
1. Madras	26,000 per annum.	1,00,000 per annum.	1,26,000 per annum.	Nil.
2. Mysore	About 1% which is produced by growers.	1,00,000 per annum.	31,000 per annum.	69,000 per annum.
3. Bombay	*2,850 for 3 years.	*44,850 for 3 years.	15,000 per annum.	900 per annum.
4. Pondicherry	3,000 per annum.	6,000 per annum.	6,000 per annum.	3,000 per annum.

\*This does not include the requirements of Kolaba, Kolhapur and South Satara districts.

The Governments of Kerala, Andhra Pradesh, West Bengal, Orissa and Assam have not furnished the required estimates. Their annual production of coconut seedlings is, however, shown below:—

State	Production target of existing nurseries	
1. Kerala	*4,59,500	seedlings per annum
2. Andhra Pradesh	1,87,500	do.
3. West Bengal	43,000	do.
4. Orissa	23,000	do.
5. Assam	17,000	do.

\* This includes 2,50,000 seedlings proposed to be raised in 50 nurseries sanctioned to be started in the National Extension Service Blocks in Kerala.

Considering the area under coconut and the number of palms per acre in the different States, the requirements of seedlings for underplanting work out as follows at the rate of 1 per cent:—

State	Area under coconut (in thousand acres)	Number of palms per acre	seedlings required per annum for underplanting
1. Kerala	1,098	70	7,68,600
2. Mysore	215	50	1,07,500
3. Madras	129	80	1,03,200
4. Andhra	84	80	67,200
5. Bombay	20	100	20,000
6. West Bengal	17	100	17,000
7. Orissa	11	65	7,150
8. Assam	2	45	900
9. Pondicherry	2	80	1,600

In this connection it may be pointed out that the Director of Agriculture, Kerala who had been addressed



regarding the question of establishing registered coconut nurseries, has stated that in Kerala “most of the large size and medium size coconut growers maintain coconut nurseries in their own gardens to meet their own requirements”, that the surplus, if any, is sold out and that there is no dearth of coconut seedlings in Kerala. Further the Government of Kerala have stated in another connection that the requirements of seedlings for planting in new areas are not considerable and that since coconut growers themselves produce seedlings to meet their requirements and also sell to others, production of seedlings by the agricultural department is mainly to popularise quality seedlings and not for meeting the entire requirements.

As regards planting in new areas, there is scope in nearly all the States. Seedlings can be planted on the embankments of irrigation canals and channels, on the bunds of paddy fields, on suitable vacant lands, etc. Information regarding the length of canals in West Bengal, Mysore and Andhra, on the embankments of which coconut seedlings can be planted as furnished by the State Governments concerned and the number of seedlings that can be planted there, is furnished below:—

State	Length of canals	Number of seedlings that can be planted 20 feet apart.
West Bengal	1,000 miles	5,28,000
Mysore	2,720 „	14,36,600
Andhra	2,100 „	11,13,000

The other State Governments have not furnished the above information.

The Sub-Committee may now estimate the additional number of coconut seedlings that may have to be produced in the different States for purposes of under-planting and new planting.

TABLE I.

Area under coconuts in India and estimated number of coconut seedlings required for underplanting annually.

State	Area under coconut in acres	No. of seedlings necessary for under-planting per year.
Kerala	10,98,502	21,97,004
Mysore	2,14,752	4,29,504
Madras	1,29,319	2,58,638
Andhra	83,708	1,67,416
Bombay	20,331	40,662
West Bengal	16,500	33,500
Orissa	10,468	20,936
Laccadives	7,269	14,538
Assam	2,000	4,000
Andamans & Nicobar	4,293	8,586
Total	15,87,142	31,74,784

TABLE II.

Area under coconuts in India and fresh area that could be planted up with coconuts.

State	Present area under coconut	New areas that could be planted up	No. of seedlings required for fresh planting.
Kerala	10,98,502	5,000	3,00,000
Mysore	2,14,752	4,000	2,40,000
Madras	1,29,319	2,000	1,20,000
Andhra	83,708	4,000	2,40,000
Bombay (including Cutch and Saurashtra)	20,331	5,000	3,00,000
West Bengal	16,500	2,000	1,20,000



Orissa	10,468	2,000	1,20,000
Laccadives	7,269	1,000	60,000
Assam	2,000	1,000	60,000
Andamans etc.	4,293	1,000	60,000
Total	15,87,142	27,000	16,20,000

16.2 lakhs of seedlings for 3 years  
or 5.4 lakhs annually.

*Coconut Nurseries - Increasing the target of seedlings to be produced - Note of the Director, Central Coconut Research Station, Kayangulam.*

The total area under coconuts in India is 15,87,142 acres as per details given in Table I. In many of the important coconut growing states like Kerala, Mysore, Madras, Andhra and Bombay where coconut cultivation has been going on from time immemorial, underplanting has been in progress to replace palms that get destroyed through senility, pest, disease, lightning, etc. Such replacements amount to about 2 plants per acre annually. On this basis, the above mentioned states account for more than 15 lakhs of acres under coconuts and so it would appear that about 30 lakhs of coconut seedlings would be required annually for underplanting alone in existing plantations.

In addition to this it is proposed to plant up fresh areas also with coconuts. Such new areas might come to about 27,000 acres as per Table II appended. For planting up such areas 16.2 lakhs of seedlings would be necessary or 5.4 lakhs per year for three years if planting of new areas is to be done on a phased programme for the remaining period of the Second Plan. Thus we would require about 35 lakhs of seedlings annually. The target of production in the coconut nurseries maintained by State Governments and financed by the Committee is about 10 lakhs seedlings per year. There is thus a gap of about 25 lakhs of seedlings. The cost of production of a seedling varies in different states. On an average it may be put at 12 annas per seedling. The seedlings are now sold at the rate of 8 annas each from

Government nurseries. Therefore, there is a net loss of about 4 annas per seedling, and for producing 35 lakhs of seedlings annually an expenditure of Rs. 8 $\frac{3}{4}$  lakhs over receipts would be required. Since the production of 35 lakhs of seedlings annually from Government nurseries may not be feasible, the possibility of encouraging private nurserymen to supply quality seedlings may be explored. It might be necessary for departmental personnel to exercise check over the quality of seedlings raised by the nurserymen. This is suggested since the natural inclination of a private nurseryman would be to increase his profit even at the expense of quality. So he might not be strict enough in the rejection of inferior seedlings. Generally a 5-10% rejection might be necessary in nurseries. Nurserymen who agree to departmental check and control may be declared as certified nurserymen and they may be given some subsidy for the production of quality seedlings.

#### *Stepping up coconut production.*

As an incentive to people to plant up new areas under coconuts the possibility of paying some subsidy on the model of the subsidy proposed for new rubber and cashew plantations may be considered.

In the coastal sandy tract commencing from Kasargod to Kanyakumari it would be possible to considerably increase the present yield if water is made available for irrigation during the dry months of the year by providing filter points.

The question of supplying fertilisers at concessional rates to coconut growers may also be considered.

In the state of Orissa from Puri to Cuttack there are extensive paddy fields along the bunds of which it would be possible to plant coconuts on a very large scale. This would apply to other paddy growing areas like the Godavary and Krishna districts of Andhra Pradesh.



Statement showing nurseries financed by the Committee under its normal activities and those functioning under the II Five-year Plan, their annual production targets and achievements for the last three years.

Nurseries functioning under the normal activities of the Committee

Nurseries functioning under the II Five-Year Plan.

Sl. No.	Location of nursery.	Date of starting.	Date of termination.	Annual target for production of seedlings.	No. of seedlings distributed in 1955 season.	No. of seedlings distributed in 1956 season.	No. of seedlings distributed in 1957 planting season.	Location of nursery.	Date of starting.	Date of termination.	Annual target of production of seedlings.	No. of seedlings distributed in 1957 planting season.
1	2	3	4	5	6	7	8	9	10	11	12	13
1.	Valiathura	5-1-'51	4-1-'61	31,500	12,695	15,719	12,980	Eravipuram	1957	31-3-'61	10,500	The first sowing was done in 1958 and seedlings will be available for distribution only in the 1959 season.
2.	Thodupuzha	5-1-'51	4-1-'61	25,000	16,674	20,131	17,359	Ramangan-galam	do.	31-3-'61	10,500	
3.	Vaikom	5-1-'46	4-1-'61	14,000	8,450	7,278	7,772	Edappally	do.	31-3-'61	10,500	
4.	Paipad	5-1-'51	4-1-'61	20,000	11,306	14,860	12,685	Kozhinj-anpara	do.	31-3-'61	10,500	
5.	Kunnathoor	5-1-'51	4-1-'61	20,000	11,725	13,139	9,051					
6.	Ollukkara	1-4-'54	31-3-'59	3,000	1,548	1,634	2,777					
7.	Wadakkan-cherry	11-7-'55	10-7-'60	3,000	—	1,210	1,698					
8.	Nileshwar:	10-11-'48	30-9-'63	30,000	32,145	12,385	30,741					
9.	Tikkoti	1-4-'54	30-9-'63	30,000	30,001	30,000	30,017					

	1957	—	5,000 Seedlings from these
10. Kazhu-kuttaam	1957	—	5,000 nurseries will be
11. Koipuram	1957	—	5,000 available for dis-
12. Mavelikara	1957	—	tribution in the
			1958 season.
13. Aryad	1957	5,000	do.
14. Ranni	1957	5,000	do.
15. Kuthu-paramba	1957	5,000	do.
16. Pulikeezh	1957	5,000	do.
17. Tellicherry	1957	5,000	do.
18. Manjeshwar	1957	5,000	do.
19. Chittur	1957	5,000	do.
Total.		2,26,500	1,24,544 1,16,356 1,25,080

42,000

### Madras State.

1. Pattukkottai	1-1-'46	31-8-'57	30,000	26,663	31,047	30,002
						Pattukkottai
						Coimbatore
						Tindivanam
						Nagercoil
						Shencottah
						1-9-'57 31-3-'61 36,000 Distribution
						1-9-'57 31-3-'61 30,000 of seedlings
						1-9-'57 31-3-'61 30,000 from the 1957
						1-9-'57 31-3-'61 15,000 nursery at
						1-9-'57 31-3-'61 15,000 Pattukkottai
						1958 31-3-'61 15,000 is in progress.
						The first sow-
						ing in the



1	2	3	4	5	6	7	8	9	10	11	12	13
												remaining four nurseries was done in 1958 and seedlings will be available for distribution only in 1959.
<hr/>												
Total.												
<hr/>												
30,000 26,663 31,047 30,002 1,26,000												

The nursery at Pattukottai came under the II Plan on 1-9-1957.

### Mysore State.

1. Hebbal	1-5-'51	30-4-'57	15,000	16,163	14,633	16,977	Hebbal	1-5-'57	31-3-'61	6,667	The target for
2. Kumta	1-2-'58	31-3-'58	10,000	9,357	10,950	10,021	Mandya	do.	31-3-'61	23,334	distribution in
							Hiriyur	do.	31-3-'61	23,334	1958-1959 was
										41,000	seedlings.
							Mangalore	do.	31-3-'61	10,000	A total number
							Somanahalli	do.	31-3-'61	8,000	of 44,320 seed-
							Hardanahalli	do.	31-3-'61	8,666	ings were how-
							Kumta	1-4-'58	31-3-'61	10,000	ever distributed
											in the 1958 sea-
											son. From 1959-
											60 onwards the
											target for distri-
											bution of seed-
											ings will be
											90,000.
<hr/>											
Total.											
<hr/>											
25,000 25,520 25,583 26,998 90,000											

The nurseries at Hebbal and Kumta were brought under the II Five-Year Plan on 1-5-'57 and 1-4-'58 respectively.

The nurseries at Hebbal and Kumta were brought under the II Five-Year Plan on 1-5-'57 and 1-4-'58 respectively.

# Bombay State.

Nandgaon 1-4-'56 31-3-'60 15,000 1930 5,417 18,563

## Orissa State.

1. Puri	1-1-'46	31-3-'61	7,500	6,848	5,480	Not Sakhigopal 1-4-'56	31-3-'61	3,000 Seedlings being distributed in 1958 season.
2. Cuttack	1-1-'46	31-3-'61	2,500	1,707	3,309	fur-		
3. Balasore	1-12-'49	31-3-'61	5,000	750	5,045	nished		
						do. Ganjam Oct. 1957	31-3-'61	5,000
						do.		8,000
Total			15,000	8,805	13,834			

## Andhra Pradesh.

1. Samalkot	1-1-'46	31-3-'61	30,000	28,386	28,358	29,342	Samalkot	Not yet started	31-3-'61	30,000	The nurseries have not started functioning.
2. Anakapalle	10-11-'48	31-3-'61	15,000	16,093	15,437	14,981	Somapetta		31-3-'61	30,000	
3. Maruteru	10-11-'48	31-3-'61	7,500	7,529	8,046	6,624	Rudrur		31-3-'61	30,000	
							Ambajipeta		31-3-'61	30,000	
							Narasapur		31-3-'61	30,000	
Total.			52,500	52,008	51,841	50,947				1,50,000	

## West Bengal.

1. Chandernagore	7-6-'51	6-6-'61	24,000	11,469	18,863	5,821	Chander-
2. Cooch Behar	20-10-'54	19-10-'59	4,000	—	2,625	2,267	nagore
							1-8-'56 31-3-'61 12,000 Seedlings raised in the 1957 nursery being distributed.
Total.			28,000	11,469	21,488	8,088	12,000



1	2	3	4	5	6	7	8	9	10	11	12	13
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Assam.

I. Kahikuchi	15-10-'51	14-10-'56	5,000	2,751	4,749	Kahikuchi	15-10-'56	31-3-'61	5,000	3,400		
The nursery was brought under the II Five Year-Plan from 15-10-'56.												
						Tinsukia		31-3-'61			2,000	
						Silchar		do.			2,000	
						Jorhat		do.			2,000	
						Goalpara		do.			2,000	
						Nowgong		do.			2,000	

Total.

5,000	2,751	4,749		17,000	3,400
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Pondicherry.

Mahe (Pallur)	1957	31-3-'61	3,000	Seedlings dis-
Pondicherry	"	31-3-'61	6,000	tribution in
				1958 season is
				In progress.
			9,000	

Total.

Laccadives.

Agathi	1956	31-3-'61	3,750	Information not available.
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## APPENDIX XI

### Secretary's Note

*Subject No. 29. Working Paper on Coconut Development under the Third, Fourth and Fifth Five-Year Plans.*

The Ministry of Food and Agriculture, Government of India had, in August 1957, requested this Committee to start advance thinking with a view to formulating suitable schemes for coconut development under the III, IV and V Plans. The State Governments were accordingly requested to forward schemes for development of coconut in their States.

In August 1958, the Ministry requested that proposals for coconut research and development under the III and IV Plans might be sent to them immediately. They also stated that it was not necessary to consult the State Governments at this stage. The undersigned had a discussion on the subject with the officials in the Ministry in August 1958 and on the basis of those discussions, proposals for coconut research and development under the III, IV and V Plans were formulated and forwarded to the Government of India.

In September 1958, the Ministry of Food and Agriculture informed this office that the Working Paper on Coconut Development prepared by them on the basis of the proposals forwarded by this office was discussed by the Working Group on Agricultural Commodities in the Ministry at their meeting held on 4-9-1958 and wanted this Committee to revise the working paper in the light of certain observations made by the Vice-President, Indian Council of Agricultural Research at that meeting. These related to the importance of filter points for irrigation, spraying to control diseases and manuring with fertilisers for increased production.

A copy of the working paper on coconut development under the III, IV and V Five-Year Plans revised in the light of the Government of India's instructions is attached to this note.



The Ministry have now requested that the revised working paper on coconut development might be placed before the Committee and its comments communicated to them.

The subject may first be considered by the Agricultural Research and Development Sub-Committee (Development Wing).

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## WORKING PAPER ON COCONUT DEVELOPMENT

### Development Programmes For Coconut Under the III, IV and V 5-Year Plans.

India has an area of 15.87 lakhs of acres under coconut with an annual production of 4151 million nuts. She is the second largest producer of coconuts in the world, but does not produce enough to meet her entire requirements of this commodity.

The area under the crop in the different coconut growing States of the Indian Union during the 5 years of the I Plan are given in Appendix I. The area figures for the years 1956-57 and 1957-58 are not yet available and those for 1955-56 are provisional. Coconut is not grown in areas where there is no rainfall. It requires a plentiful supply of soil moisture and atmospheric humidity for its growth and satisfactory yield and so wherever facilities are available irrigation is resorted to during the hot months of the year in order to maintain soil moisture. Thus in Kerala although it is a heavy rainfall area the palms are watered in a limited area during the period, January to May, in order to save them from the ill effects of drought. This is found particularly necessary in the sandy tracts where the water table goes down very low during the period mentioned above. The dependence on irrigation is, however, more pronounced in areas where the rainfall is comparatively light. Such areas are found in parts of Mysore, Madras, Bombay and Orissa and their extent is shown separately in Appendix I as irrigated area.

The production of coconuts during the 5 years of the I Plan in the various coconut-growing States is given in Appendix II. As in the case of area, production figures for 1956-57 and 1957-58 are not yet available and those for 1955-56 are provisional.

Coconut development programmes did not find place in the 1st Five-Year Plan. They were, however, included in the II Plan. The total deficit at the end of the II Plan period, taking into account the deficit at the commencement of the period and the increased demand that would accrue as a result of the rise in population and the growing requirements of the industries consuming coconut oil, were estimated at 870 million nuts.

The coconut development schemes that the State Governments are already implementing or may be implementing during the remaining period of the II Plan are expected to step up the production of nuts at the end of 1960-61 by about 350 million nuts only, leaving a shortfall of about 500 million nuts to reach the Planning Commission's target for the II Plan.

Although the Government of India have suggested for the III Plan an annual increase of 5 per cent over the production target of the II Plan, it may be difficult of achievement in the case of a perennial crop like the coconut and the target of annual increase in production during the III Plan period may be fixed at 150 million nuts. During the IV Plan period this may be fixed at 200 million nuts per annum.

As, however, the shortfall in production of 500 million nuts during the II Plan period will also have to be made up during the III Plan, the per annum increase in production to be targeted for during the III Plan will really be 250 million nuts.

This increase in production during the III Plan period will have to be achieved in the existing coconut gardens by the adoption of short-term measures of intensive cultivation. For stepping up production during the IV and subsequent Plans, however, it would be necessary to continue the existing long-term measures during the III Plan period and adopt fresh ones, if need be.



The annual value of the coconuts and coconut products that have to be imported at present as a result of the deficit in the country's production is about Rs. 15 crores. If the country could be made self-sufficient in coconuts and coconut products, as is proposed to be done, through the development programmes under the II and III Five-Year Plans, the above mentioned annual drain of Rs. 15 crores in foreign exchange could be eliminated and if ultimately we produce enough to export, coconut will become a valuable foreign exchange earner.

When India starts producing a surplus of coconuts, the coconut oil that would be available from them can be utilised to feed industries such as the manufacture of soaps, toiletries and margarine which may be expected to command foreign markets. It is also possible to start the desiccated coconut industry in India with the availability of surplus nuts. Desiccated coconut is very much in demand in Western countries for the sweets and confectionery industries and the world suppliers today are the Philippines and Ceylon. The desiccated coconut industry has not flourished in India because this country is deficit in her production of coconuts and all the nuts that are produced are required either for consumption as fresh nuts or as copra or coconut oil.

When India becomes a surplus producer, the price of coconuts which now is higher than what obtains in countries like Ceylon and the Philippines may be expected to come down and adjust itself to world prices and thus enable this country to compete on equal terms in foreign markets for the sale of desiccated coconut.

The measures to be adopted for stepping up the production of coconuts may be classified, as mentioned already, into (a) short-term and (b) long-term. The present average yield of a coconut palm per annum is only 35 nuts. It has, however, been proved that by regular cultivation and manuring and proper pest and disease control it should be easy to raise the per tree yield to 55 nuts per annum on an average. The short-term measures for stepping up production will, therefore,

aim at running demonstration plots to prove the efficacy of improved methods of cultivation and doing intensive propaganda among coconut growers, distributing coconut manures in all the coconut growing areas, providing facilities for irrigation during summer in areas subject to drought during that season, providing an effective and extensive plant protection service and offering incentives for stepping up production by such means as the declaration of coconut as a food crop with a view to make coconut growers eligible for the subsidised supply of manures and fertilisers, and plant protection equipments and pesticides and the guarantee of a minimum price for coconuts. Long-term measures include the bringing of additional area under coconut cultivation, the distribution of quality coconut seedlings for underplanting and new planting and the undertaking of research on such aspects as breeding for hybrid vigour, manuring, button shedding, control of pests and diseases etc.

In the implementation of the coconut development programme under the II Plan, the Government of India were dealing directly with the State Governments concerned in the matter of approving schemes and making funds available. This has resulted in the Indian Central Coconut Committee not having sufficient say in the proper execution of the schemes. It is, therefore, suggested that under the III Plan the development schemes may be executed through the Indian Central Coconut Committee like the present research schemes.

(a) *Short-term measures.*

(i) *Demonstration and Propaganda*

It has been practically shown at coconut research stations and demonstration centres that by regular cultivation and manuring and prompt control of pests and diseases the per tree yield of coconuts could be raised to 55 per annum. It is very important that these practical results should be demonstrated as widely as possible and therefore demonstration centres should be started at as many suitable places as possible.

Under the II Plan provision has been made to start about 300 demonstration plots. It is proposed to start



600 plots under the III Plan at an estimated cost of Rs. 6 lakhs. The number of plots will be increased to 800 under the IV Plan and 1000 under the V Plan, the estimated cost being Rs. 8 lakhs and Rs. 10 lakhs respectively.

(ii) *Distribution of manures and fertilisers.*

The most important reason why the average per annum per tree yield of the coconut palm in India is so low as 35 nuts, is the absence of regular and adequate manuring of coconut gardens in most of the States. In many areas the soil lacks in essential plant nutrients. Potash deficiency in the soils of the West Coast where about 70 per cent of the Indian area under coconut is concentrated, is well known and potash is required more than the other plant nutrients for coconut to grow and yield adequately. Coconut growers, being mostly small holders, are not able to find the means of purchasing fertilisers regularly for application to their palms. In order to induce them to take to manuring regularly and adequately it is necessary to make available to them manures and fertilisers in sufficient quantities and at a reasonable price and also to see that these manures are distributed through departmental depots and agricultural co-operatives.

The application of fertilisers to the coconut was not practised on any appreciable scale during the I Plan period. Available information shows that an area of 8000 acres in Kerala only was covered by fertilisers during the period. The area covered during the exhausted years of the II Plan is also limited. A tabular statement showing the quantities of fertiliser used and the area covered by them during the period under reference is given in Appendix III.

As application of fertilisers constitutes one of the most important steps for improving the yield of nuts per tree, it is proposed to intensify work on this aspect as far as possible during the next 15 years. The total area under coconut in India is 15.87 lakh acres. It is proposed to fertilise 80 per cent of the total area by the end of the Fifth Plan i. e. by 1976. In the Third and Fourth Plan periods, the coverage will be 30 per cent and 50 per cent



of the total area respectively. For fertilising one acre of coconuts, a total quantity of 560 lb. consisting of 175 lb. of ammonium sulphate, 210 lb. of super-phosphate and 175 lb. of sulphate of potash or muriate of potash are required. Working on this basis, the requirements of fertilisers during the third, fourth and fifth plan periods will be about 6 lakhs, 10 lakhs and 16 lakhs tons respectively. The break up of fertiliser mixture required during the Third, Fourth and Fifth Plan periods will be as follows:—

	III Plan Period (in tons)	IV Plan Period (in tons)	V Plan Period (in tons)
1. Ammonium sulphate	1,87,500	3,12,500	5,00,000
2. Super phosphate	2,25,000	3,75,000	6,00,000
3. Muriate of potash	1,87,500	3,12,500	5,00,000
Total	6,00,000	10,00,000	16,00,000

The cost of 560 lb. of fertilisers required for an acre of coconuts has been estimated to be Rs. 93. The per acre increase in the yield of NPK treated plots has been estimated at 738 nuts which at current prices is estimated to cost about Rs. 147. Thus the application of fertilisers is definitely profitable for the cultivator.

(iii) *Irrigation facilities in coastal sandy type of soil*

A considerable proportion of area under coconut in India lies in the coastal belt of Kerala, Madras, Andhra Pradesh and Orissa States consisting of the sandy type of soil. In sandy soils the water table goes down so deep during the summer that the coconut palms are affected by drought and there is considerable fall of immature nuts resulting in reduced yield. If, however, the palms are irrigated during the summer months this reduction in yield could be avoided. It is, therefore, proposed to provide for the installation of 1000 filter point pumpsets during the III Plan period. The cost of a filter point and lining pipe would be about Rs. 350 and that of an engine and pumpset Rs. 2,750. The cost of filter point and lining pipe may be subsidised and the cost of engine and pumpset realised from the growers on



easy instalment basis. The cost on this account for the III Plan period may be estimated at Rs. 31 lakhs. For the IV & V Plans an additional 1000 filter points may be provided in each Plan period at the same cost.

A filter point may be estimated to cover an area of 10 acres. The increased yield per tree may be estimated at 10 nuts per annum and the total extra yield from the area covered by the filter point at 6,500 nuts which at the current price of nuts may be estimated to cost Rs. 1,300.

iv) *Pest and disease control.*

In the Travancore-Cochin area of Kerala State the root and leaf diseases of the coconut palm constitute a major limiting factor in production taking as they do a heavy toll of the yield of the palms. About 70 lakhs of coconut palms standing on about 1 lakh of acres in the Travancore-Cochin area of Kerala are affected by the root and leaf diseases. The reduction in yield on account of the diseases is estimated at 1,000 nuts per acre or about 10 crores of nuts in all, which at the current price of Rs. 200 per 1,000 nuts may be estimated to cost Rs. 2 crores. Regular spraying of the palms with pesticides has been found to control the diseases and when accompanied by regular manuring and cultivation the affected palms have been found to give economic yields. The spraying of the healthy palms in a wide enough belt round the diseased area is also essential as a prophylactic measure to prevent the spread of the diseases to new areas. If these diseases and pests are not controlled by intensive and extensive spraying operations, they may spread to the other coconut areas of Kerala which accounts for about  $\frac{2}{3}$  of the total area in India and eventually wipe out a major part of the production of this commodity in the country.

During the 5 years of the I Plan the Indian Central Coconut Committee was running a small scale scheme to demonstrate the efficacy of spraying as a means of controlling the leaf disease. Spraying squads were deputed to various parts of the area in which the coconut palms were affected by the leaf disease and they undertook to do the spraying for a nominal fee. In

1954-55 and 1955-56 the Indian Central Coconut Committee extended grant-in-aid to three spraying schemes sponsored by the Kerala Government.

Under the II Plan a scheme for the regular spraying of coconut palms in the disease-affected areas is being implemented by the State Government with Central aid. It is essential to continue it during the III, IV & V Plan periods also. It is proposed to make a provision of Rs. 105 lakhs for each of the III, IV and V Plan periods for the purpose. As a small fee of 1 anna per spraying is collected from coconut growers under the scheme, receipts of the order of Rs. 43 lakhs may be anticipated from the scheme during each Plan period.

A statement showing the number of sprayings done during the 5 years of the I Plan and the exhausted years of the II Plan is given in Appendix IV.

The question has to be considered whether the spraying of diseased coconut palms can continue as at present under the auspices of the State Government. Spraying will have to be done as a regular seasonal operation for many years to come and it would be desirable to consider whether it could not be done by private or non-official agencies. The Director of Agriculture, Kerala who was consulted in the matter is of the opinion that it is not yet time to leave organised large scale spraying to private agencies. If, however, any competent non-official agency is prepared to undertake the work in any particular area the Director thinks that the Government agency could pull out of that area.

There is no doubt that spraying should ultimately become a seasonal operation to be undertaken by the cultivators themselves just as manuring or intercultivation. The sooner this is done the better it would be and so a beginning may be made in the III Five-Year Plan in this direction. Provision may be made to entrust the work to the Farmers' Forum in one or two taluks and if the experiment proves successful this organisation may be asked to take up the work in more taluks and perhaps ultimately the whole State.

A considerable number of well-to-do growers are no doubt in a position to purchase their own sprayers and



get the spraying done themselves. They may also be in a position to hire out their sprayers to their neighbours and thus it may be possible to cover a considerable area by private effort. In order to induce the growers thus to purchase sprayers and do the spraying themselves it would, however, be desirable to arrange for the sale of sprayers and pesticides at a subsidised price of 50% of the actual price.

It is suggested that provision may be made in the III, IV and V Plans to purchase 1000 sprayers and sell them to cultivators at 50% of the cost. Provision may also be made to stock pesticides for supply to those who go in for the subsidised sprayers and to others who may need them at a concessional rate of 50% of the actual price.

A sum of Rs. 2.5 lakhs may be provided for the purchase of the sprayers and a sum of Rs. 30 lakhs for the purchase of pesticides during each of the three plan periods. Half the above amounts will, however, be realised when the sales are effected so that the net expenditure on the subsidised supply of sprayers and pesticides in each of the three plan periods will be only Rs. 16.25 lakhs.

It is also necessary to make provision for the biological control of *Nephantis serinopa* which is a serious pest of the coconut palm. The pest *Nephantis serinopa* eats away the leaves of the coconut palm. This defoliation devitalises the tree. The reduction in the functioning area of the leaf surface causes a great reduction in the production of nuts. The maximum extent of reduction of yield is noticeable in the year following that of defoliation and is about 50 per cent. Sporadic outbreak of the pest occurs at various places in all the coconut growing areas and the parasites of the pest are released in the affected areas as soon as the presence of the pest is noticed. Some work in this direction was done during the I Plan period when stations were started in Kerala, Madras and Andhra Pradesh to breed parasites that would destroy the pest. Under the II Plan, stations for breeding parasites of the pest which destroy it at various stages have been set up in some of the States and it is necessary to continue them under the

III, IV and V Plans. A provision of Rs. 2.55 lakhs in the III Plan and Rs. 2.75 lakhs in the IV Plan and Rs. 3 lakhs in the V Plan may be made for the purpose. The number of parasites released during the I Plan period and the exhausted years of the II Plan are given in Appendix V.

b) *Long-term measures.*

As already mentioned long-term measures include the bringing of additional area under coconut cultivation, the supply of quality seedlings for underplanting and new planting and the organisation of research. The long-term measures can be expected to yield results only after about 10 years of the initiation of the measures and for the same reason these measures have to be initiated at the earliest opportunity so that the results may start to flow as early as possible and continue in the future plans.

1) *Increasing the area under coconut.*

The area under coconut can be increased by bringing under the crop suitable waste lands, reclaiming low-lying water-logged areas and by planting coconut on the banks of canals, irrigation channels and the bunds of paddy fields. It is proposed to bring about 20,000 acres of new area under coconut during the III Plan and 16,000 acres each during the IV Plan and V Plan periods. The break-up of the additional area for the various States is as below:—

	<i>III Plan</i>	<i>IV Plan</i>	<i>V Plan</i>
Kerala	8,000	3,000	3,000
Mysore	3,000	3,000	3,000
Madras	2,000	2,000	2,000
Andhra Pradesh	4,000	4,000	4,000
Bombay	1,000	1,000	1,000
West Bengal	1,000	1,000	1,000
Orissa	1,000	1,000	1,000
Assam	500	500	500
Laccadives	100	—	—
Andamans & Nicobars	4,000	—	—
	<u>19,600</u>	<u>15,500</u>	<u>15,500</u>



In Kerala State the area proposed to be brought under cultivation consists of low-lying areas in which paddy cultivation is uneconomical, but cultivation of coconuts on bunds would be profitable. It is also possible to reclaim here shallow backwater areas and cultivate coconut on bunds.

In Mysore cultivation is possible on canal banks and certain areas now lying fallow.

In Madras there are possibilities of growing coconuts in sandy areas and the State Government have a scheme to bring under coconut such sandy areas in Ramanathapuram district by settling families in the area and giving them subsidies.

In Madras also it is proposed to plant seedlings on canal banks.

In Andhra Pradesh canal banks and suitable waste lands are proposed to be planted up.

In West Bengal and Assam suitable waste lands can be brought under coconut.

In the Andamans and Nicobars forest land is proposed to be cleared and brought under the crop while in the Laccadives a shallow lagoon is proposed to be reclaimed for the purpose.

The extra yield when the entire area newly planted under the III Plan comes to bearing stage may be estimated at 5.88 crores of nuts.

The number of nuts from the area planted up during the IV Plan may be estimated at 4.65 crores of nuts. The cost for the III Plan is estimated at Rs.61.5 lakhs and that for the IV and V Plans at Rs. 40.00 lakhs each.

(ii) *Supply of quality seedlings.*

In a perennial crop like the coconut where the tree begins to yield only after about 8 to 10 years of planting it is extremely important to be very careful about the quality of the seedlings planted. It is, therefore, proposed to run in the various states additional coconut nurseries that would fulfil the demand for coconut seedlings required for underplanting and new planting. The

seedlings will be sold at the concessional rate of eight (8) annas each.

The total number of existing coconut nurseries in the various coconut growing States is 69 with an annual production target of 7.84 lakhs of seedlings. A sub-Committee of this Committee which considered the requirements of seedlings for underplanting and new planting estimated that the number of seedlings required per annum for underplanting would be of the order of 9.53 lakhs at the rate of 1 per cent replacement. This number of seedlings per annum will be required for each of the 5 years of the III Plan. Besides, 2.35 lakhs of seedlings will be required per annum for planting up a new area of 3,920 acres per annum for the Third Plan. The total number of seedlings required per annum for the Third Plan period will thus be 11.88 lakhs. As against this the production target of the existing nurseries is 7.84 lakhs per annum. The extra production per annum during the Third Plan period will, therefore, be of the order of 4 lakhs of seedlings. The bulk of these seedlings will be required in the States of Kerala and Mysore where about 35 more nurseries may have to be started for producing them. Thus for raising a total number of 59.4 lakhs of seedlings during the Third Plan period, a total number of 104 nurseries (the existing 69 and 35 new nurseries) will be required.

The annual requirements of seedlings for underplanting during the IV and V Plan periods also will be 9.53 lakhs. As an area of 15,500 acres is proposed to be planted up newly during each of these periods we shall require 1.86 lakhs of seedlings per annum for this purpose. Thus the total annual requirements during the IV and V Plan periods will be of the order of 11.39 lakhs only and the total requirements for each of the two Plan periods will be 56.95 lakhs. It may be sufficient to continue in the IV and V Plan periods the 104 nurseries functioning during the III Plan, to produce the seedlings required during the IV and V Plan periods.

A statement showing the number of quality seedlings distributed during the I Plan period and the exhausted years of the II Plan is given in Appendix VI.



iii. *Undertaking of Research.*

Proposals regarding the undertaking of research have been submitted separately.

For carrying out the development programme (excluding research for which detailed programme and estimated expenditure have been separately furnished) outlined above, an over-all provision of Rs. 25.45 crores has been provided in the III Plan. Out of this provision, Rs. 22.32 crores are for the supply of manures and fertilisers for five years at the rate of Rs. 4.47 crores per annum. Receipts from some of the schemes add up to Rs. 88.96 lakhs and the net expenditure will, therefore, be Rs. 24.56 crores. If the manures are supplied on a loan basis to the cultivators, almost all the Rs. 22.32 crores estimated for this purpose will also accrue as receipts leaving only Rs. 2.24 crores as the net expenditure on the developmental side of the III Plan. To this, if the estimated expenditure of about Rs. 51 lakhs proposed for research programme is also added, the net expenditure for the III Plan will be about Rs. 2.75 crores.

The net expenditure for the IV Plan will be Rs. 2.82 crores on the above basis, and the net expenditure for the V Plan Rs. 2.95 crores on the same basis.

Details of the programme with the estimated financial outlay are given in Appendix VII.

A consolidated statement of expenditure, State-wise, under each item of the programme is given in Appendix VIII.

In Appendix IX is given a consolidated statement of expenditure item-wise.

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# APPENDIX I.

## Statement of the area under Coconut in the States and Centrally administered areas during the I Plan period.

Sl. No.	Name of State.	1951-'52.			1952-'53.		
		Total area. (in acres)	Area under assured rain- fall (in acres)	Irrigated area. (in acres)	Total area. (in acres)	Area under assured rain- fall (in acres)	Irrigated area. (in acres)
1.	Kerala	10,69,572	10,69,572	—	10,70,719	10,70,179	—
2.	Mysore	2,11,353	1,82,758	28,595	2,13,440	1,84,623	28,817
3.	Madras	1,31,233	1,06,568	24,665	1,33,925	1,09,193	24,732
4.	Andhra Pradesh	87,290	87,290	—	82,082	82,082	—
5.	Bombay	20,218	5,218	15,000	19,979	1,679	18,300
6.	West Bengal	16,500	16,500	—	16,500	16,500	—
7.	Orissa	10,923	7,123	3,800	10,955	7,155	3,800
8.	Laccadives	7,213	7,213	—	7,222	7,222	—
9.	Andamans	4,293	4,293	—	4,293	4,293	—
10.	Assam	2,000	2,000	—	2,000	2,000	—

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## APPENDIX I (continued).

### Statement of the area under Coconut in the States and Centrally administered areas during the I Plan period.

Sl. No.	Name of State.	1953-'54.			1954-'55.			1955-'56.		
		Total area. (in acres)	Area under assured rain- fall.	Irrigated area.	Total area. (in acres)	Area under assured rain- fall.	Irrigated area.	Total area. (in acres)	Area under assured rain- fall.	Irrigated area.
1.	Kerala	10,88,417	10,88,417	—	10,98,502	10,98,502	—	11,06,895	11,06,895	—
2.	Mysore	2,12,944	1,80,822	32,122	2,14,752	1,82,222	32,531	2,18,100	1,85,221	32,879
3.	Madras	1,31,290	1,07,014	24,276	1,29,139	1,04,907	24,232	1,27,221	1,02,943	24,278
4.	Andhra Pradesh	84,636	84,636	—	83,708	83,708	—	87,990	87,990	—
5.	Bombay	20,331	7,631	12,700	20,331	7,131	13,200	20,520	6,820	13,700
6.	West Bengal	16,500	16,500	—	16,500	16,500	—	16,500	16,500	—
7.	Orissa	11,208	7,408	3,800	10,468	6,668	3,800	11,805	8,005	3,800
8.	Laccadives	7,269	7,269	—	7,269	7,269	—	5,860	5,860	—
9.	Andamans	4,293	4,293	—	4,293	4,293	—	4,293	4,293	—
10.	Assam	2,000	2,000	—	2,000	2,000	—	2,000	2,000	—

## APPENDIX II

### Production of Coconuts in India During 1951-52 to 1955-56.

State	Production of coconuts in thousands.			
	1951-52	1952-53	1953-54	1954-55
Kerala	21,48,955	21,51,249	27,13,973	27,41,141
Mysore	3,34,414	5,64,283	5,58,935	5,69,029
Madras	4,02,396	4,14,258	4,26,847	4,18,214
Andhra Pradesh	3,21,360	3,05,852	3,15,139	3,11,241
Bombay	29,853	29,493	30,021	29,470
West Bengal	22,205	22,205	22,205	22,205
Orissa	34,157	33,669	32,647	29,377
Laccadives &				
Amindivi Islands	15,362	15,380	15,474	15,474
Andamans &				
Nicobar Islands	2,500	2,500	2,500	2,500
Assam	12,787	12,787	12,787	12,787
Total	33,23,989	35,51,676	41,30,528	41,51,438
				43,69,571

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### APPENDIX III

Statement showing the quantity of fertilisers used and area covered during the I Plan period and exhausted years of II Plan.

Name of State	1951—56				1956—57				1957—58				Remarks
	Quantity of fertilisers used		Area covered		Quantity of fertilisers used		Area covered		Quantity of fertilisers used		Area covered		
	Tons	lbs.	Acres	Cents	Tons	lbs.	Acres	Cents	Tons	lbs.	Acres	Cents	
1. Kerala	500	—	8000	00	560	00	5600	00	738	00	8800	00	* Only insignificant quantities used as there is no manuring on an appreciable scale.
2. Mysore @													
3. Madras *													
4. Andhra Pradesh	nil		nil		nil		nil		nil		nil		
5. Bombay @													
6. West Bengal	nil		nil		nil		nil		nil		nil		@ Informa-
7. Orissa @													tion not avail-
8. Laccadives									6	00			able.
9. Andamans @													
10. Assam	nil		nil		nil		nil		nil		nil		
11. Pondicherry	nil		nil		00	896	6	40	1	2178	29	50	

# APPENDIX IV

Statement showing the number of sprayings done during the I Plan period and exhausted years of II Plan						
Name of state	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57 1957-58
Kerala	90,764	1,05,762	86,665	2,60,051	1,60,287	26,31,017 75,00,000

# APPENDIX V

Statement showing number of parasites released during the I plan period & exhausted years of II plan						
Name of state	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57 1957-58
1. Kerala	—	—	1,74,461	3,19,085	15,90,776	4,81,847 —
2. Madras	—	—	—	—	8,040	—
3. Andhra Pradesh	—	—	68,18,630	13,81,171	77,50,900	92,30,120 81,75,838



## APPENDIX VI

Statement showing the number of seedlings distributed during the First Five-Year Plan and exhausted years of II Plan

Name of state	1951-52		1952-53		1953-54		1954-55		1955-56		1956-57		1957-58	
	No. of Seedlings distributed	Area covered	No. of Seedlings distributed	Area covered	No. of Seedlings distributed	Area covered	No. of Seedlings distributed	Area covered	No. of Seedlings distributed	Area covered	No. of Seedlings distributed	Area covered	No. of Seedlings distributed	Area covered
1. Kerala	57,621	823	61,986	886	88,197	1260	1,65,133	2359	142921	2042	1,02,984	1471	1,25,080	1787
2. Mysore	10,685	153	8,614	123	8,757	125	19,418	208	25520	365	24,654	352	25,977	371
3. Madras	76,765	1097	78 470	1121	80,718	1153	60,275	861	26663	381	31,047	443	30,002	429
4. Bombay	—	—	663	9	2,274	32	4,130	59	1930	28	5,417	77	18,563	265
5. Andhra Pradesh	32,181	460	29,466	421	30,357	433	30,445	435	52008	743	51,841	741	51,506	736
6. Orissa	11,929	170	3,378	48	13,916	199	8,805	126	13834	198	13,928	199	23,484	336
7. West Bengal	—	—	—	—	2,756	39	14,212	203	11469	164	21,488	307	8,088	115
8. Assam	—	—	—	—	1,212	17	3,128	45	2751	39	4,749	68	4,400	47
9. Committee's Nursery at the Central Coconut Research Station Kasaragod	10,901	156	5,043	72	8,539	122	8,939	128	7114	101	9,740	139	8,490	121

## APPENDIX VII.

### A. *Short-term measures.*

#### 1. *Demonstration and Propaganda.*

(1) *Kerala State.* 234 demonstration plots were sanctioned for Kerala State under the II Five-Year Plan to demonstrate to the cultivators the benefits of the application of fertilisers and adoption of improved cultural practices. Of these, 115 plots have been laid out in 1957. The remaining 119 plots are proposed to be laid out in 1958. During the III Plan period the 234 plots will be continued and an additional 18 plots are also proposed to be laid out. The total cost of running the 252 plots in the III Plan period is estimated at Rs. 3,45,900 and the receipts anticipated are of the order of Rs. 40,950 for the III Plan period. The net expenditure will thus be Rs. 3,04,950.

(2) *Mysore.* 50 demonstration plots are proposed to be laid out in Mysore State under the III Five-Year Plan at a net cost of Rs. 50,000.

(3) *Madras.* Under the II Five-Year Plan 150 demonstration plots have been sanctioned for Madras State under a coconut development scheme. All these are being laid out. These will be continued during the III Plan also and the expenditure on this is estimated at Rs. 91,000.

(4) *Andhra Pradesh.* 50 demonstration plots have been laid out in Andhra Pradesh under the II Plan. They are proposed to be continued during the III Plan period at a net cost of Rs. 50,000.

(5) *Bombay.* Two demonstration plots are proposed to be laid out in Kutch area of Bombay State under the II Plan. In addition to continuing these, 18 plots are also proposed to be laid out under the III Plan at a net cost of Rs. 20,000.

(6) *West Bengal.* Twenty (20) demonstration plots are proposed to be laid out during the III Five-Year Plan. The expenditure for the purpose is estimated at Rs. 20,000.



(7) *Orissa*. During the III Plan period, 25 demonstration plots may be laid out in Orissa State. The expenditure for the purpose may be estimated at Rs. 25,000.

(8) *Assam*. 15 demonstration plots are proposed to be laid out in Assam during the III Five-Year Plan period. The expenditure for the purpose is estimated at Rs. 15,000.

(9) *Laccadives*. During the III Plan period, 10 demonstration plots are proposed to be laid out in the Laccadives at an estimated cost of Rs. 10,000.

(10) *Andamans*. 10 demonstration plots are proposed to be laid out in the Andamans under the III Plan at an estimated cost of Rs. 10,000.

(11) *Pondicherry*. Four (4) demonstration plots are proposed to be laid out in Pondicherry during the III Plan period at a cost of Rs. 4,000.

*Thus a total number of 604 demonstration plots are proposed to be laid out in the country during the III Plan period at an estimated cost of Rs. 6,00,000 (round). A total number of 800 demonstration plots are proposed to be maintained during the IV Plan period and 1000 plots in the V Plan period in the country at an estimated cost of Rs. 8,00,000 and Rs. 10,00,000 respectively.*

## 2. *Distribution of manures and fertilisers.*

The requirements of State-wise distribution of fertilisers during the Third Five-Year Plan according to acreage will be as under:—

State	Ammonium Sulphate	Super Phosphate	Muriate of Potash	Total
	tons	tons	tons	tons
i) Kerala	1,28,750	1,54,500	1,28,750	4,12,000
ii) Mysore	26,475	31,800	26,475	84,750
iii) Madras	15,150	18,200	15,150	48,500
iv) Andhra Pradesh	9,775	11,700	9,775	31,250
v) Bombay	2,345	2,810	2,345	7,500

vi) West Bengal	1,925	2,325	1,925	6,175
vii) Orissa	1,250	1,450	1,250	3,950
viii) Assam	235	280	235	750
ix) Laccadives	860	1,030	860	2,750
x) Andamans	500	625	500	1,625
xi) Pondicherry	235	280	235	750
Total	1,87,500	2,25,000	1,87,500	6,00,000

### 3. Irrigation facilities.

(1) *Kerala State.* Six hundred (600) Filter Points are proposed to be installed in Kerala State during the III Plan period for providing adequate irrigation to the coconut palms in the sandy areas. The cost of 600 Filter points and pump-sets is estimated at Rs. 18,60,000.

(2) *Madras.* Two hundred (200) Filter Points and pump-sets are proposed to be installed in Madras State for irrigating coconut palms in sandy areas in the State at a cost of Rs. 6,20,000 during the III Plan Period.

(3) *Andhra Pradesh.* One hundred and fifty (150) Filter Points and pump-sets at a cost of Rs. 4,65,000 are proposed to be installed in Andhra Pradesh during the III Plan period for irrigating coconut palms in sandy areas.

(4) *Orissa.* Fifty (50) Filter Points and pump-sets at a cost of Rs. 1,55,000 are proposed to be installed in Orissa State under the III Plan for irrigating coconut palms in sandy areas.

*It may thus be seen that a total number of 1,000 Filter Points are proposed to be installed during the III Plan at an estimated cost of Rs. 31 lakhs. Additional 600 Filter points in Kerala, 200 in Madras, 150 in Andhra Pradesh and 50 in Orissa are proposed to be installed during each of the IV and V Plan periods also at a total cost of Rs. 31,00,000 for each plan period.*

### 4. Pests and diseases control.

#### (a) Spraying scheme.

*Kerala State.* The comprehensive scheme for spraying the coconut palms in all the disease-affected areas in



Kerala State sanctioned under the II Plan is proposed to be continued in the III, IV and V Plan periods at a cost of Rs. 1,05,00,000 for each plan period. Recovery of spraying charges during each Plan period is estimated at Rs. 43,00,000. It is also proposed to make a provision of Rs. 32.5 lakhs for the subsidised sale of 1000 sprayers and pesticides for each of the three Plan periods.

(b) *Biological control of pests.*

(1) *Kerala State.* The parasite breeding station set up at Kozhikode under the II plan will have to be continued during the III, IV and V Plan periods also. The expenditure during the III Plan is estimated at Rs. 19,052 and that for the IV and V Plans at Rs. 21,000 and Rs. 24,000 respectively.

(2) *Madras.* The two stations at Nagercoil and Gudiyattam functioning under the II Plan are proposed to be continued during the III, IV and V Plan periods also. The expenditure during the III Plan is estimated at Rs. 62,820 and that during the IV and V Plans at Rs. 67,820 and Rs. 76,000 respectively.

(3) *Andhra.* The two stations at Razole and Ambajipeta sanctioned under the II Plan are proposed to be continued under the III, IV and V Plans also. The expenditure during the III Plan is estimated at Rs. 87,305 and that during the IV and V Plans Rs. 93,300 and Rs. 1,00,000 respectively.

(4) *Bombay.* The two stations at Alibag and Ratnagiri sanctioned during the II Plan will have to be continued during the III, IV and V Plans also at an estimated cost of Rs. 85,920, Rs. 92,420 and Rs. 1,00,000 respectively.

*It may thus be seen that the expenditure on biological control of pests for the III, IV and V plan periods, is estimated at Rs. 2.55 lakhs, Rs. 2.75 lakhs and Rs. 3.00 lakhs respectively.*

B. *Long-term measures.*

1. *Increasing the area under coconut.*

(1) *Kerala.* An additional area of 3,000 acres is proposed to be brought under coconut cultivation in

Kerala State during the III Plan. A sum of Rs. 7,50,000 is proposed to be given as subsidy to the coconut growers for this purpose.

(2) *Mysore*. In Mysore State also an additional 3,000 acres are proposed to be brought under coconut during the III Plan period. The subsidy to be given to the growers for the purpose is estimated at Rs. 7,50,000.

(3) *Madras*. An additional area of 2,000 acres is proposed to be brought under coconut in Madras State during the III Plan, and the subsidy for the purpose is estimated at Rs. 5,00,000.

(4) *Andhra Pradesh*. There is considerable scope for extending coconut cultivation in Andhra Pradesh. During the III Plan it is proposed to bring 4,000 acres under coconut at an estimated cost of Rs. 10,00,000 for subsidy.

(5) *Bombay*. It is proposed to bring an additional 1000 acres under coconut in Bombay State at a cost of Rs. 2,50,000 for subsidy.

(6) *West Bengal* and (7) *Orissa*. In West Bengal and Orissa also, 1,000 acres each of additional land is proposed to be brought under coconut during the III Plan at an estimated cost of Rs. 2,50,000 for each State for giving subsidy to growers.

(8) *Assam*. In Assam State it is proposed to bring an additional area of 600 acres under coconut during the III Plan period. The expenditure for the purpose is estimated at Rs. 1,25,000 by way of subsidy.

(9) *Laccadives*. An area of 100 acres is proposed to be reclaimed and brought under coconut in the Laccadives during the III Plan at a cost of Rs. 3,00,000.

(10) *Andamans & Nicobars*. In the Andamans 2,000 acres of forest land is proposed to be cleared and brought under coconut cultivation at a cost of Rs. 12,29,100. In the Nicobars also 2,000 acres of land is proposed to be brought under coconut at a cost of Rs. 7,45,800.



(11) *Pondicherry*. There seems to be no scope for bringing additional area under coconut in Pondicherry State.

*It may thus be seen that a total additional area of 19,600 acres is proposed to be brought under coconut cultivation during the III Plan period at an estimated cost of Rs. 61.5 lakhs (round).*

*During the IV and V Plan periods a total additional area of about 16,000 acres during each Plan period is proposed to be brought under coconut at an estimated cost of Rs. 40,00,000 towards subsidy for each Plan period.*

## 2. *Supply of quality seedlings.*

(1) *Kerala*. A total number of 34,74,000 seedlings will have to be produced. The total expenditure for this purpose is estimated at Rs. 43,42,500 and a sum of Rs. 17,37,000 is estimated as receipts.

(2) *Mysore*. The total requirements of seedlings will be of the order of 8,25,000. The total cost of production is estimated at Rs. 10,31,250 and the receipts at Rs. 4,12,500.

(3) *Madras*. The requirements will be of the order of 5,07,000 seedlings. The expenditure for the purpose is estimated at Rs. 6,33,750 and receipts at Rs. 2,53,500.

(4) *Andhra*. The requirements are 4,92,000 seedlings. The estimated cost of production is Rs. 6,15,000 and receipts Rs. 2,46,000.

(5) *Bombay*. The total requirements will be 1,20,000 seedlings and the cost of producing them is estimated at Rs. 1,50,000. The receipts are estimated at Rs. 60,000.

(6) *West Bengal*. The requirements are 1,11,000 seedlings. Cost of production will be Rs. 1,38,750 and receipts Rs. 55,000.

(7) *Orissa*. The requirements will be 93,000 seedlings. Cost of production and receipts will be Rs. 1,16,250 and Rs. 46,000 respectively.

(8) *Assam*. The number of seedlings required is 36,000, the cost of production and receipts being Rs. 45,000 and Rs. 18,000 respectively.

(9) *Laccadives*. It is proposed to produce 27,800 seedlings in the islands at an estimated cost of Rs. 34,750. The receipts will be Rs. 13,900.

(10) *Andamans*. It is proposed to produce 2,52,000 seedlings at an estimated cost of Rs. 3,15,000. The receipts will be Rs. 1,26,000.

(11) *Pondicherry*. The production of seedlings will be of the order of 6,000 at an estimated cost of Rs. 7,500, the receipts being Rs. 3,000.

The total expenditure for the supply of quality seedlings during *the III Plan period is estimated at about Rs. 74.29 lakhs and that during the IV and V Plan period is estimated at about Rs. 71.20 lakhs for each Plan period.*

*The total receipts from sale of seedlings during the III Plan period will be Rs. 29.71 lakhs and those for the IV and V Plan periods Rs. 28.48 lakhs for each Plan period.*

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## APPENDIX - VIII

Statement showing the expenditure under the III Plan for the various schemes in the different States

Name of State	Control of pests & Diseases						
	Demonstration Plots	Distribution of manures & fertilisers	Irrigation facilities in coastal sandy type of soil	(a) Spraying scheme including subsidy for purchase of 1000 sprayers and pesticides	(b) Biological control of pests	Increase in area	Supply of quality seedlings
	Rs. in lakhs	Rs. in lakhs	Rs. in lakhs	Rs. in lakhs	Rs. in lakhs	Rs. in lakhs	Rs. in lakhs
Kerala	3.05	1532.65	18.60	78.25	0.19	7.50	26.00
Mysore	0.50	315.25	—	—	—	7.50	6.19
Madras	0.91	180.40	6.20	—	0.63	5.00	3.80
Andhra Pradesh	0.50	116.25	4.65	—	0.87	10.00	3.69
Bombay	0.20	27.90	—	—	0.86	2.50	0.90
W. Bengal	0.20	22.95	—	—	—	2.50	0.83
Orissa	0.25	14.60	1.55	—	—	2.50	0.69
Assam	0.15	2.80	—	—	—	1.25	0.27
Laccadives	0.10	10.25	—	—	—	3.00	0.21
Andamans	0.10	6.05	—	—	—	19.75	1.89
Pondicherry	0.04	2.80	—	—	—	—	0.05
Total	6.00	2231.90 or 31.00 2232.00 (round)	78.25	2.55	61.50	44.57	

## APPENDIX IX

### Consolidated statement of Expenditure, Receipts and Net Expenditure under the III and IV Plans.

Type of Schemes	III Plan		IV Plan		V Plan	
	Expenditure	Receipts	Expenditure	Receipts	Expenditure	Receipts
	Rs. in lakhs Rs. in lakhs		Rs. in lakhs Rs. in lakhs		Rs. in lakhs Rs. in lakhs	
1. Demonstration Plots	6.00	—	8.00	—	10.00	—
2. Distribution of manures and fertilisers	2232.00	2232.00	3720.00	3720.00	5952.00	5952.00
3. Irrigation facilities in coastal sandy type of soil	31.00	—	31.00	—	31.00	—
4. Control of Pests and Diseases	137.50	59.25	137.50	59.25	137.50	59.25
a) Spraying scheme	2.55	—	2.75	—	3.00	—
b) Biological control of coconut pests						
5. Increasing area under coconut cultivation	61.50	—	40.00	—	40.00	—
	74.29	29.71	71.20	28.48	71.20	28.48
6. Supply of quality seedlings						
Total	2544.84	2320.96	4010.45	3807.73	6244.70	6039.73
Net Expenditure under the III Plan including the sum of Rs. 51.02 lakhs on Research assuming that cost of manures will be recovered.			Rs. 2.75 crores			
Net Expenditure under the IV Plan including the sum of Rs. 80 lakhs on research assuming that cost of manures will be recovered.			Rs. 2.82 crores			
Net Expenditure under the IV Plan including the sum of Rs. 90 lakhs on research assuming that cost of manures will be recovered.			Rs. 2.95 crores			



*Priorities, policies, measures and machinery for achieving both short-term and long-term objectives.*

*Priorities.*

*Short-term objectives:*— Priority may be in the following order:—

- 1) Supply of manures.
- 2) Control of pests and diseases.
- 3) Laying out of demonstration plots.

*Long-term objectives:*— Priority may be in the following order:—

- 1) Expansion of the Secretariat of the Committee and of research at the Central Coconut Research Stations.
- 2) Supply of quality seedlings.
- 3) Setting up of Regional Coconut Research Stations.
- 4) Bringing new area under coconut cultivation.
- 5) Diseases investigation scheme in Andhra Pradesh.

*Policies.*

To induce the coconut grower to apply himself to the task of stepping up production he must be assured of a fair price for his produce. A fair price must therefore be maintained either by the mechanism of import control or by assuring the grower of a minimum price.

*Machinery*

The work at the Central Coconut Research Stations will be done directly under the Committee's control. Regional Research Stations will be worked by the State Governments under the Committee's technical control.

Under the Second Five-Year Plan the Central Government is dealing directly with the States as far as development schemes are concerned. It is suggested that under the Third and subsequent plans the development schemes may be implemented by State Governments under the Committee's own auspices, the required grant being made available to the Committee by the Central Government.

## APPENDIX XII

### Secretary's Note

#### *Extension Scheme*

#### *Subject No. 31.*

1. Name of the Scheme: *Coconut nursery scheme, Ollukara, Kerala State.*
2. Location: *Ollukara, Kerala State.*
3. Object of the scheme: *To distribute 7,500 quality seedlings annually.*
4. Date of commencement of the scheme: *1-4-1954.*
5. Date of termination of the present scheme: *31-3-1959.*
6. Results achieved in brief: *A total number of 10,180 seedlings has been distributed from 1-4-1954 to 1-5-1958 as against the target of 9,750 seedlings.*
7. Reasons for extension: *The demand for coconut seedlings produced in Government coconut nurseries is increasing. It is, therefore, necessary to continue the scheme.*
8. Duration of extension: *5 years from 1-4-1959 to 31-3-1964.*
9. Cost of the extension under the following heads:
  - a) **Expenditure:**

Non-recurring	Nil
Recurring	Rs. 38,633.
Share of the Committee (33½%)	Rs. 12,876.
Share of the State Government (66½%)	Rs. 25,757.



- |                                 |             |
|---------------------------------|-------------|
| b) Receipts:                    | Rs. 19,000  |
| Share of the Committee          |             |
| (33 $\frac{1}{3}$ %)            | Rs. 6,335.  |
| Share of the State              |             |
| Government (66 $\frac{1}{3}$ %) | Rs. 12,665. |
| c) Net cost:                    | Rs. 19,633. |
| Share of the Committee          | Rs. 6,541.  |
| Share of the State              |             |
| Government                      | Rs. 13,092. |
10. Remarks of the Secretariat on the proposal
- 1) The target for distribution of seedlings in the existing nursery scheme is 3,000 seedlings per annum. As the demand for seedlings produced in the Government nurseries is increasing, it is proposed to raise the target to 7,500 seedlings per annum under the extension scheme.
- 2) A sum of Rs. 3,800 has been anticipated as receipts (Rs. 3,750 from the sale of 7500 seedlings and Rs. 50 miscellaneous receipts), during 1959-60. The receipts that would be realised from the sale of seedlings in 1959-60 can only be from seedlings raised in the last year of the existing scheme which have to be shared by the Committee and the State Government in the same proportion in which the receipts are shared under the original scheme. The receipts of Rs. 3,750 from the sale of seedlings in 1959-60 cannot therefore be taken into account in calculating the receipts from the extension

scheme. No mention has been made about the receipts from the sale of seedlings raised in the last year of the extension scheme i. e. in 1963-64. As the Committee is meeting its share of expenditure on raising the nursery, it is only appropriate that it should be allowed to share the receipts even though they may be realised only in 1964-65 after the termination of the extension scheme. The total receipts from the extension scheme will thus be Rs. 19,000.

The Committee may now decide whether they would approve of the extension proposal and agree to meet a net expenditure of Rs. 6,541.

The subject may first be considered by the Agricultural Research and Development Sub-Committee (Development Wing).

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### **Extension Proposals of the Coconut Nursery Scheme, Ollukara For A Period of 5 Years From 1-4-1959.**

#### **I. *Introduction:***

The Coconut Nursery Scheme at Ollukara was sanctioned by the erstwhile Travancore-Cochin Government, for a period of 5 years, as per their G. P. A. 3-3483/53/Fd. D., dated 31-5-1954. With 50% financial assistance from the Indian Central Coconut Committee, the scheme is being worked at the Central Farm, Ollukara. As per the existing sanction, the term of the scheme is due to expire on 31-3-59. In view of the increased demand for quality seedlings from the public, it is proposed to continue the scheme for a further period of 5 years from 1-4-59 to 31-3-1964.



## II. *Objective of the scheme:*

Objective of the scheme is to make available to the public quality coconut seedlings. The coconut growers of this locality who are benefited by the Peechi Irrigation scheme are seen coming forward to plant more coconut seedlings in their lands. As such they are in need of disease-free quality seedlings.

## III. *Continuance of coconut nursery scheme:*

It is found necessary due to the pouring demand of coconut seedlings produced at Government Nurseries to increase the target of planting of 10,000 seednuts for another 5 years.

It is estimated that 75% of the total seednuts planted can be distributed as selected quality seedlings to the public, i. e., 7,500 seedlings will be made available for supply during the next 5 years from 1-4-60 to 1964.

## IV. *Review of the work done under the scheme:*

The work done so far under the scheme is explained below:

### (a) *Production and supply of selected seedlings:*

Selected parent trees were being marked at Agricultural Research Station, Ollukkara from December onwards and procurement of seednuts was done from January to June. Planting of seednuts in prepared beds was being done from June to July. The nursery was regularly irrigated and the supply of seedlings was done from February to May every year.

The seednuts planted and seedlings distributed during the years from 1-4-54 to 1-5-58 are given below:-

<i>Seednuts planted</i>				<i>Seedlings distributed</i>			
1954-55	55-56	56-57	57-58	54-55	55-56	56-57	57-58
2750	4000	4000	6000	1762	1636	2777	4005

During the former years of nursery, the percentage of quality seedlings distributed were not good as a good number of seedlings were destroyed due to severe white ant attack. With the change of site and applications of

guesarol 550, the condition is seen to have been improved. During this year 6000 nuts have been planted and 80.5% germinated so far.

(b) *Propaganda:*

The Fieldman of the nursery during his tours to study the survival of seedlings supplied to the growers, contact coconut growers and give advice on after-care of seedlings. A good number of departmental pamphlets on coconut cultivation were given to the parties who visited the Farm.

V. *Programme of work for the scheme.*

Under the present proposed scheme, it is proposed to distribute 7500 quality seedlings each year with a target of 10,000 seednuts.

VI. *Venue of work:*

The existing nursery of this station is located in plot No. 15 of the Farm with barbed wire fencing. With the increase of target of production some more land has to be taken and so a fresh wire fencing will be needed for which the required amount has been provided in the budget proposals.

VII. *Duration of the Scheme:*

The scheme is proposed to be extended from 1-4-'59 and worked for a period of 5 years i. e., up to 1-4-1964.

VIII. *Staff:*

Details of staff are given hereunder.

Sl. No.	Staff.	No.
1.	Fieldman, Coconut nursery	1.
2.	Servant (Peon)	1.

IX. *Programme of work to be attended by the staff:*

The various items of work to be attended by the staff are given below:—

- i) To survey the coconut area of this station and outside for selecting good parent palms.
- ii) Visiting the garden during the harvest of the seednuts.



- iii) Harvest and selection of seednuts and transporting them to the Nurseries.
- iv) Storing seednuts in sand till they are required for planting in June-July.
- v) Preparing seedbeds and planting seednuts.
- vi) Supervision of nursery operations such as noting down the dates of germination, other growth characters etc.
- vii) Timely control of pests and diseases in the nursery.
- viii) Selection of quality seedlings.
- ix) Removal of quality seedlings from beds and sale.
- x) Maintenance of proper accounts, records and registers.
- xi) Advising the coconut growers about the planting and care of seedlings.

#### X. *Finance:*

*Expenditure:* The gross expenditure for the extending period of 5 years i. e., up to 1-4-64 is estimated at Rs. 38,633.00 against an anticipated receipts of Rs. 19,000.00. This will be shared between the I. C. C. C. and State Government in the ratio of 1:2. The net share of expenditure to the Indian Central Coconut Committee is Rs. 12,878/- and that of State Government is Rs. 25,755/-.

*Receipts:—* The total anticipated receipts from the scheme during the extended period of 5 years is Rs. 19,000.00. The Receipt to be shared between the committee and State Government works out to Rs. 19,000.00 and the share of the receipts of the Committee 1:2 basis is Rs. 6,335.00 and that of State Government is Rs. 12,667.00.

Detailed particulars are furnished in the appendices enclosed.

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**Details of Expenditure and Receipts of the Coconut Nursery, Agricultural  
Research Station, Ollukkara for Five Years Commencing from 1-4-1959 to 1-4-1964.**

	Establishment charges.			
	1959-1960	1960-1961	1961-1962	1962-1963
<b>Fieldman 1</b>				1963-1964
Pay	652.00	696.00	750.00	810.00
Dearness Pay	60.00	60.00	60.00	60.00
Dearness Allowance	336.00	336.00	336.00	336.00
Special Dearness Allowance	137.00	108.00	72.00	60.00
<b>Peon 1</b>				
Pay	371.00	383.00	395.00	407.00
Dearness Pay	60.00	60.00	60.00	60.00
Dearness Allowance	262.00	264.00	264.00	264.00
Special Dearness Allowance	144.00	144.00	144.00	144.00
Travelling Allowance	300.00	300.00	300.00	300.00
<b>Total</b>	<b>2322.00</b>	<b>2351.00</b>	<b>2381.00</b>	<b>2441.00</b>
				<b>2513.00</b>



# Details under Contingencies.

Particulars.	1959-60	1960-61	1961-62	1962-63	1963-64	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1. Cost of 10,000 seednuts at Rs. 250 per 1000.	2500.00	2500.00	2500.00	2500.00	2500.00	12500.00
2 Harvesting, packing and transporting at Rs. 40 per 1000.	400.00	400.00	400.00	400.00	400.00	2000.00
3. Packing gunnies at Rs. 12.5 per 1000 seednuts.	125.00	—	—	—	—	125.00
4. Preparing nursery bed, carting sand, forming bunds etc. at Rs. 65 per 1000 nuts.	650.00	650.00	650.00	650.00	650.00	3250.00
5. Planting nuts, weeding, spraying etc. at Rs. 60 per 1000.	600.00	600.00	600.00	600.00	600.00	3000.00
6. Fencing the nursery site with barbed wire.	500.00	—	—	—	—	500.00
7. Irrigation charges at Rs. 20 per 1000 nuts.	200.00	200.00	200.00	200.00	200.00	1000.00
8. Shading the nursery area at Rs. 50 per 1000.	500.00	500.00	500.00	500.00	500.00	2500.00
9. Cost of erecting temporary shed to preserve seednuts.	250.00	—	—	—	—	250.00
10. Other miscellaneous unforeseen itmes.	300.00	300.00	300.00	300.00	300.00	1500.00
Total.	6025.00	5150.00	5150.00	5150.00	5150.00	26625.00

# A B S T R A C T.

A. Expenditure.	1959-60	1960-61	1961-62	1962-63	1963-64	Total.
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1. Pay of establishment.	1,143.00	1,199.00	1,265.00	1,337.00	1,409.00	6,353.00
2. D. A. and special D. A. of establishment.	879.00	852.00	816.00	804.00	804.00	4,155.00
3. Travelling allowance and other allowances.	300.00	300.00	300.00	300.00	300.00	1,500.00
4. Other charges (Contingencies).	6,025.00	5,150.00	5,150.00	5,150.00	5,150.00	26,625.00
Gross expenditure.	8,347.00	7,501.00	7,531.00	7,591.00	7,663.00	38,633.00
5. Expenditure to be shared between I. C. C. C. and State Government on $33\frac{1}{3}:66\frac{2}{3}$ basis.	8,347.00	7,501.00	7,531.00	7,591.00	7,663.00	38,633.00
6. Share of expenditure of I. C. C. C. at $33\frac{1}{3}\%$ .	2,782.00	2,500.00	2,510.00	2,530.00	2,554.00	12,876.00
7. Share of the State Government at $66\frac{2}{3}\%$ .	5,565.00	5,001.00	5,021.00	5,061.00	5,109.00	25,757.00
B. Receipts.						
Total gross receipts.	3,800.00	3,800.00	3,800.00	3,800.00	3,800.00	19,000.00
2. Receipts to be shared between I. C. C. C. and State.	3,800.00	3,800.00	3,800.00	3,800.00	3,800.00	19,000.00
3. Share of receipts of I. C. C. C. at $33\frac{1}{3}\%$ .	1,267.00	1,267.00	1,267.00	1,267.00	1,267.00	6,335.00
4. Share of receipts of State Government.	2,533.00	2,533.00	2,533.00	2,533.00	2,533.00	12,665.00
Share of expenditure of I. C. C. C.	2,782.00	2,500.00	2,510.00	2,530.00	2,554.00	12,876.00
Minus share of receipts.	1,267.00	1,267.00	1,267.00	1,267.00	1,267.00	6,335.00
3. Net expenditure of I. C. C. C.	1,515.00	1,233.00	1,243.00	1,263.00	1,287.00	6,541.00
4. Share of expenditure of State Government.	5,565.00	5,001.00	5,021.00	5,061.00	5,109.00	25,757.00
5. Share of receipts of State Government.	2,533.00	2,533.00	2,533.00	2,533.00	2,533.00	12,665.00
6. Net expenditure of State Government.	3,032.00	2,468.00	2,488.00	2,528.00	2,576.00	13,092.00



## APPENDIX XIII

### Secretary's Note

#### *Final Report (Nursery Scheme)*

#### *Subject No. 34.*

1. Name of the scheme: Comprehensive scheme for the establishment of coconut nurseries in *Madras State*.
2. Location: (1) *Nileshwar* (2) *Pattambi* (3) *Pattukkottai* (4) *Tindivanam* (5) *Samalkot* (6) *Maruteru* (7) *Anakapalle* (8) *Coimbatore* (9) *Tikkoti*.

The First eight nurseries were set up under the scheme originally sanctioned for 5 years from 10-11-1948. The nurseries at Samalkot, Anakapalle & Maruteru fell within the territory of the new Andhra State from 1-10-1953. The nursery at Tikkoti was set up on 1-4-1954 under the extension scheme and the nursery at Pattambi was closed down on 30-9-1954. With the re-organisation of the States on 1-11-1956, the nurseries at Nileshwar and Tikkoti came under the jurisdiction of the Kerala State. The nursery at Pattukkottai alone continued to function under the scheme from 1-11-1956 to 31-8-1957.
3. Object of the Scheme: To distribute 1,60,000 seedlings during the first 5 years of the scheme from the eight nurseries originally set up

and 90,000 seedlings from the three nurseries functioning under the extension scheme.

4. Duration of the Scheme: 8 years 8 months and 21 days (from 10-11-1948 to 31-8-1957). The scheme was sanctioned for the period 10-11-1948 to 30-9-1958 but was terminated on 31-8-1957.

5. Date of commencement of the scheme 10-11-1948.

6. Cost of the scheme

a) *Expenditure sanctioned*

Non-recurring Rs. 1,500

Recurring Rs. 10,91,247.

Share of the Committee Rs. 4,32,611 (50% of the recurring expenditure excluding rent of land, railway freight on seedlings pre-paid for the first 5 years and 33½% of the shareable recurring expenditure for the extension period from 10-11-1953 to 30-9-1958).

Share of the State Government

Rs. 6,60,136 (Entire non-recurring expenditure, rent of land and railway freight on seedlings and 50% of the remaining recurring expenditure for the first five years and 66⅔% of the recurring expenditure for the period 10-11-1953 to 30-9-1958).

b) Receipts

Rs. 6,58,738 (sale proceeds of seedlings and ungerminated seednuts plus railway freight pre-paid recovered from parties).



Share of the Committee	Rs. 2,22,900 (40% of the receipts excluding railway freight on seedlings recovered from parties to whom seedlings have been supplied).
Share of the State Government	Rs. 4,35,838 (Entire receipts realised from recovery of railway freight and 60% of the remaining amount).
c) Net cost	Rs. 4,34,009.
Share of the Committee	Rs. 2,09,711.
Share of the State Government	Rs. 2,24,298.
d) Committee's share of actual expenditure for the duration of the scheme	Rs. 4,09,669.60 (The amount represents the Committee's share of expenditure according to the grant-in-aid statements on nurseries functioning in the Madras State).
e) Committee's share of receipts	Rs. 1,65,081.82 (Relates to receipts realised from the sale of seedlings in the nurseries functioning in Madras State).
7. Achievements under the scheme under the following heads.	
a) Number of seednuts collected	13,54,324.
b) Number of seednuts sown	12,86,045.
c) Number of seedlings targeted	9,05,200.
(d) Number of quality seedlings obtained and distributed:	7,89,782

8. Remarks of the Secretariat on the final report:

1) The scheme was initially sanctioned for a period of 5 years from 10-11-1948 and eight nurseries, one each at Nileshtar, Pattambi, Pattukkottai, Coimbatore, Tindivanam, Samalkot, Maruteru and Ankapalle with a production target of 1,60,000 seedlings per annum were set up under it. The nurseries at Coimbatore and Tindivanam with a production target of 12,800 seedlings were closed down on the termination of the sanctioned period and the nurseries at Smalkot, Anaka-palle and Maruteru having a production target of 32,000 seedlings per annum came under the jurisdiction of the Andhra State on 1-10-1953. The nurseries at Nileshtar, Pattambi and Pattukkotti continued to function under the scheme sanctioned for the interim period from 10-11-1953 to 31-3-1954. The nursery at Pattambi was closed down on 30-9-1954. Under the extension of the scheme sanctioned from 1-4-1954 to 30-9-1958, the nurseries at Nileshtar and Pattukkottai were continued and a new nursery was set up at Tikkoti. The production target of each of the three nurseries was fixed



at 40,000 seedlings per annum. With the re-organisation of the States on 1-11-1956, the nurseries at Nileshtar and Tikkoti fell within the territory of Kerala State and the nursery at Pattukkottai alone continued to function under the comprehensive scheme until 31-8-1957 when that nursery was brought under the II Five-Year Plan. Thus the scheme sanctioned by the Committee was terminated on 31-8-1957 although the sanction for it existed up to 30-9-1958. The report, therefore, covers the period 10-11-1948 to 31-8-1957.

2) The report gives an account of the working of the nursery at Marudur also. This nursery was sanctioned under a separate scheme which functioned from 29-4-1950 to 30-9-'54 and the final report on it has already been considered by the Committee at its 21st Meeting (January 1955).

3) According to Statement No. 2 attached to the report, a total number of 13,54,324 seednuts were collected for the nurseries (excluding Marudur nursery) as against a target of 13,76,000 seednuts required to produce the targeted number of seedlings. It would, how-

ever, appear from statement No. 3, that a total number of 13,66,045 seednuts were sown in the nurseries under the scheme (including 80,000 seednuts sown in the 1956 nursery at Nileshtar and Tikkoti but excluding those sown in the Marudur nursery). The Director of Agriculture, Madras has been requested to reconcile the discrepancy in the number of seednuts collected and number sown in the nurseries.

4) A total number of 7,89,792 seedlings were actually distributed under the scheme (excluding those distributed from the Marudur nursery) as against 9,05,200 seedlings that should have been distributed as per the target. The above figures do not include the number of seedlings distributed from and the targets of the 1953 nursery at Samalkot and the 1956 nursery at Nileshtar and Tikkoti as distribution of the seedlings from the above nurseries commenced after they came under the jurisdiction of the Andhra and Kerala States.

5) The figures of expenditure and receipts shown against item 6 (a) to (c) above are in respect of the sanctioned scheme for the period



10-11-1948 to 30-9-1958, including those on the nurseries at Nileshtar and Tikkoti. The actual expenditure incurred and receipts realised under the scheme for the period 10-11-1948 to 31-8-1957 according to the report were of the order of Rs. 9,30,172 to Rs. 4,02,781 respectively. These, however, related only to the expenditure incurred and receipts realised by the Madras Government on the Scheme. The expenditure incurred on the nurseries at Nileshtar and Tikkoti after 1-11-1956 and the receipts realised after 1-11-1956 from the sale of seedlings raised in those nurseries have, however, not been included in the above statement.

The report may be considered first by the Agricultural Research and Development Sub-Committee (Development Wing).

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## SECTION A. INTRODUCTION

### A. *History of the Scheme:*

The Comprehensive scheme for the Establishment of Government coconut nurseries in the important centres of Madras Province was sanctioned by the Government of Madras in their G. O. Ms. No. 5154 Development, dated 19-10-1948 with reference to letter No. F. 83/47, dated 17-9-1948, of the Secretary, Indian Central Coconut Committee. The Coconut nursery Schemes in East Godavari and Tanjore and Malabar district which were functioning from 1st January 1946 and 1st September 1947 respectively were merged in the comprehensive Coconut Nursery Scheme from November 1948.

The scheme in the first instance was sanctioned for a period of 5 years from the date of commencement. It was implemented on 10th November 1948. Eight nurseries were started under this scheme in Nileshtar, Pattambi, Pattukkottai, Tindivanam, Samalkot, Maruteru, Anakapalle and Coimbatore. The ninth nursery for Tiruchirappalli District was sanctioned by the Madras Government in G. O. No. 344. Food and Agriculture dated 23-2-1950. The nursery at Marudur in Trichy District started functioning from 29th April 1950.

With the formation of Andhra State, the Coconut nurseries at Samalkot, Maruteru and Ankapalle were transferred to Andhra State from 1st October 1953. The sanction for the scheme expired on 9th November 1953, when the other nurseries at Tindivanam and the Central Farm at Coimbatore were closed. The scheme was extended temporarily from 10th November 1953 to 31st March 1954 with the nurseries at Nileshtar, Pattambi and Pattukkottai pending issue of final orders in Government letter No. 38638 N/53-3 Food and Agriculture dated 30th July 1953.

In G. O. Ms. No. 3218, Agriculture dated 31st October, 1954 sanction for the continuance of the Comprehensive Nursery Scheme was accorded with the nurseries at Nileshtar and Pattukkottai along with a new Nursery at Tikkoti near Badagara with the financial assistance of the Indian Central Coconut



Committee for a further period of  $4\frac{1}{2}$  years from 1st April 1954 to 30th September 1958. The Coconut Nursery at Pattambi was allowed to continue under the Comprehensive Nursery Scheme with the financial assistance of the Indian Central Coconut Committee for a period of 6 months from 1-4-1954 to 30-9-1954, as the seedlings raised in the Nursery during 1953 season were expected to be disposed of by 30-9-1954. The new nursery sanctioned under the extension scheme located at Tikkoti near Badagara started functioning from 12th November 1954. The nursery at Pattambi was closed on 30-9-1954.

Consequent on the re-organisation of States on 1-11-1956 the nurseries at Nileshwar and Tikkoti got merged with the Kerala Government with the only one Nursery remaining at Pattukkottai in Madras State.

The comprehensive Nursery scheme operated in Madras State for running the coconut nursery at Pattukkottai was terminated on 31st August 1957, consequent on the implementation of the new comprehensive coconut nursery scheme included in the Second Five-Year Plan with effect from 1-9-1957.

## 2. *Object of the scheme:*

As coconut is a perennial palm which lives upto an age of over 80 years, it is very important that only seedlings of approved quality which will ultimately give economic yields are planted. The demand for such selected seedlings has been consistently high every year. But it has not been possible to meet the demand to any great extent from the existing Government nurseries. There are also no established coconut nurserymen in this province who can be relied upon to supply seedlings of good quality. The objective of the scheme is therefore to produce and supply the public with selected seedlings of guaranteed quality on a large scale so that the possibility of planting inferior seedlings may be eliminated as far as possible.

The nursery at Pattukkottai continued to function from the date of inception of the scheme to the date of termination of the scheme. The nurseries at Samalkot,

Maruteru and Anakapalle, got merged with the Andhra State and the nurseries at Tikkoti and Nileshtar got merged with the Kerala State as a result of re-organisation of States. The nurseries at Coimbatore, Tindivanam and also at Marudur were closed as they were found uneconomical. The following is the target of supply aimed at each of the following nurseries:

<i>Location of the Nursery.</i>	<i>Target for the supply of quality seedlings every year</i>
1. Pattukkottai	19,200
2. Nileshtar	48,000
3. Pattambi	48,000
4. Coimbatore	6,400
5. Tindivanam	6,400
6. Anakapalle	6,400
7. Samalkot	19,200
8. Maruteru	6,400
9. Marudur	6,000
<b>Total</b>	<b>1,66,000</b>

The nursery at Pattambi in South Malabar was closed and a new nursery at Tikkoti in North Malabar was started to supply 30,000 quality seedlings every year.

3. *Duration with dates of starting and termination.*

The comprehensive Nursery Scheme with the financial assistance from the Coconut Committee was implemented on 10-11-1948 and terminated on 31-8-1957.

4. *Staff sanctioned for the Scheme.*

The following were the staff sanctioned for the scheme:—

Sl. No.	Designation	Scale of pay	Sanctioned strength
1.	Gazetted Assistant	230-30/2-260-40/2 500-50/2-700	1
2.	Assistants	100-5-140-EB-10-220	10
3.	Upper Division Clerk	80-3-95-5-110	1
4.	Fieldman	45-2-55-1-60	14
5.	Maistries	20-1-30	14



The names of officers and staff who worked the scheme from time to time are furnished in Appendix I.

### 5. Expenditure incurred and receipts realised.

The total expenditure incurred, total receipts realised and the net expenditure from 10-11-1948 to 31-8-1957 is furnished below:

Sl. No.	Year	Expenditure	Receipts	Net expenditure
1.	1948-49	81,561	—	81,561
2.	1949-50	1,47,029	34,431	1,12,598
3.	1950-51	1,66,008	60,946	1,05,062
4.	1951-52	1,46,364	88,523	57,841
5.	1952-53	1,16,511	62,058	54,453
6.	1953-54	1,17,420	69,637	47,783
7.	1954-55	62,632	17,918	44,714
8.	1955-56	58,766	42,766	46,000
9.	1956-57	27,412	18,579	8,833
10.	1-7-57 to 31-8-57	6,469	7,923	1,454 (Minus)
Total		9,30,172	4,02,781	5,27,391

### Section B - Technical Programme.

1. *Selection of parent trees:* The different taluks of the districts of South Kanara, Malabar, Tanjore, South Arcot, East & West Godavari, Vizagapatnam and Coimbatore which are noted for coconut cultivation will be toured by the nursery staff with a view to select mother palms which are suitable for propagation. In selecting the trees, the criteria already established will be followed scrupulously. Particular attention will be paid to the following aspects:

(i) The trees will be selected in disease-free gardens which contain a fairly high percentage of desirable mother palms.

(ii) The palms selected for propagation will be middle aged with compact spherical crowns and will have large number of leaves with short, stout petioles.

(iii) Only regular and heavy bearing trees with round or spheroid medium sized nuts having thick kernel and short peduncle (flower stalk) which does not buckle will be selected as parent trees.

(iv) Trees producing barren nuts and those that have a tendency to shed nuts will be avoided.

2. *Selection of seednuts.* Seed coconuts intended for raising seedlings will be selected from bunches maturing in the summer months of January to June every year. The nuts will be harvested periodically when they are fully mature. Ill-developed nuts and those showing unhealthy signs or not having water inside will be rejected. The selected seednuts will be packed in sealed bags and despatched to the concerned nursery site and stored in sand in a cool and shady place before they are planted in the nursery beds.

3. *Raising the nursery.* Nursery beds of convenient sizes will be laid on sand in a suitable place near an irrigation source. The nuts grouped according to the locality and months of harvest will be planted vertically with the stalk ends up with a spacing of 1 foot between nuts in the south west monsoon period. The nursery beds will be watered regularly to ensure good germination and proper growth of the seedlings. During summer the seedlings will be provided with shade to protect them against the severe heat of the sun.

#### 4. *Nursery studies.*

The following observations will be made in the nursery to form the basis for selection of seedlings:

- i) Date of germination of individual seednuts.
- (ii) Rate of production of leaves.
- iii) Number of functioning leaves.
- iv) Girth at collar.
- v) Height of seedlings.
- vi) Splitting of leaflets.
- vii) General condition of individual seedlings.



### 5. *Distribution of selected seedlings.*

Based on the nursery studies the seedlings considered suitable for propagation, will be supplied to the coconut growers in the different parts of the State on indents received in advance. Detailed information on spacing, method of planting, after-care and management of coconut plantations will be furnished to the growers at the time of supply of the seedlings. As far as possible growers will be advised to raise large plantations of coconuts instead of in small isolated patches so that the holding may prove economical in the long run. A complete record of the indents and the supply of seedlings made will be maintained at each nursery with a view to watch the progress and performance of the seedlings supplied from each centre.

### **Section C - Results.**

The Coconut nursery staff of different nursery centres attended to the selection of parent palms, procurement of seed coconut, raising of nurseries, distribution of quality seedlings according to the technical programmes.

The achievement in each centre during different years of the scheme period is furnished in the six statements attached.

### **Section D - Summary.**

The comprehensive Coconut Nursery Scheme was implemented in Madras State on 10-11-1948 in different centres with a view to meet the growing demand for quality coconut seedlings. In the first instance, nurseries were opened in 8 centres at Nilesishwar, Pattambi, Coimbatore, Pattukkottai, Tindivanam, Samalkot, Maruteru and Anakapalle to distribute 1,60,000 quality seedlings every year. Subsequently another nursery at Marudur was started in 1950 to produce 6,000 quality seedlings every year. Consequent on the re-organisation of States on 1-10-1953 the nurseries at Samalkot, Maruteru and Anakapalle got merged with Andhra State and again on further re-organisation on 1-11-56 the nurseries

at Tikkoti and Nileshtar got merged with Kerala. The small nurseries at Tindivanam, Coimbatore and Marudur were closed as they were found uneconomical.

All the nurseries except those at Marudur and Tikkoti were located in the Government Agricultural Research Station. Those at Marudur and Tikkoti were located in private land taken on lease.

The nursery staff toured intensively the reputed seednut centres in Madras State and selected ideal parent palms to procure the targeted number of seednuts for each nursery.

The demand for quality coconut seedlings was increasing every year and it was not possible to cope up with the actual demands for coconut seedlings. A total of 8,07,921 quality seedlings has been distributed from all the nurseries, both before re-organisation and after re-organisation of States.

The performance of the seedlings supplied from the nurseries in many places is satisfactory. Many seedlings distributed during the initial period of the scheme have commenced bearing. The coconut growers are highly pleased with the performance of the quality seedlings supplied by the department. The coconut nursery staff in addition to their attending to the nursery work, also toured the coconut tracts and gave directions on the proper method of planting and their after-care. They have also done propaganda to adopt systematic cultural and manurial practices and to take timely measures for the control of pests and diseases with a view to increase coconut production.

Pamphlets on the planting and after-care of coconut seedlings and on "Improved methods of Coconut Cultivation" were also distributed for the benefit of the coconut growers.

Quality coconut seedlings, rejected seedlings, ideal seed coconuts, manures required for coconut etc., are displayed in the important exhibitions held to educate the farmers on the value of planting quality coconut seedlings and the benefit of manuring coconut.



### Section E - Development Work.

The Coconut Development Scheme sanctioned for the first time in Madras State was implemented on 11-6-1958. Six Coconut Development Assistants have been posted for undertaking coconut development work in this State. They were all given training on all aspects of coconut cultivation for a period of one month at Pattukkottai centre. They commenced their regular work from August 1958.

It is proposed to undertake the following items of work under this scheme.

1. Bringing more area under coconut by planting quality coconut seedlings.
2. Replacing uneconomic palms with quality seedlings.
3. Increasing the area under regular cultural and manurial practices.
4. Laying demonstration plots to educate the farmers about the value of cultural and manurial practices.
5. Advocating the taking of timely measures for the control of pests and diseases.
6. Bringing more coconut gardens under irrigation particularly during hot weather in places where facilities for tapping sub soil water exist.

### APPENDIX I.

The following officers operated the scheme.

1. Shri S. G. Aiyadurai, Gazetted Assistant to the Oilseeds Specialist, Coimbatore who was solely in-charge of the scheme.
2. Shri S.D.S. Albuquerque, Gazetted Assistant to Oilseeds Specialist, Coimbatore, who was solely in-charge of the scheme consequent on transfer of Shri S. G. Aiyadurai as Assistant Oilseeds Specialist, Groundnut scheme.
3. Shri P.M. Sayeed, Superintendent, Agricultural Research Station, Nileshtar was in additional charge

of the scheme when the post of the Gazetted Assistant to the Oilseeds Specialist, was kept in abeyance.

4. Shri S. D. S. Albuquerque, Superintendent, Agricultural Research Station, Nileshtar was also in additional charge of the scheme when Shri P. M. Sayeed was transferred as Pepper Specialist, Taliparamba.
  5. Shri A. Abdul Samed, Oilseeds Specialist, operated the scheme from 1-11-1956 to 29-12-1956 in the residuary Madras State.
  6. Shri P. A. Mohammed Ibrahim, Assistant Oilseeds Specialist, Pattukkottai took complete charge of the scheme from 30-12-1956 and continued till the termination of the scheme on 31-8-1957.
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# STATEMENT No. 1.

## 1. Selection of parent trees.

The particulars of parent trees selected in different nursery centres during the scheme period is furnished below.

Sl. No.	Name of the Nursery Centre	Years										Total No. of parent trees selected.
		1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1-7-57 to 31-8-57	
1.	Nileshwar	2,058	2,926	2,588	2,791	2,150	1,738	1,399	2,580	—	—	18,230
2.	Pattambi	2,704	3,328	3,495	3,420	6,020	—	—	—	—	—	18,967
3.	Pattukkottai	2,619	2,051	1,960	1,639	2,900	487	1,570	2,500	4,672	—	20,398
4.	Tindivanam	656	290	1,245	448	369	—	—	—	—	—	3,008
5.	Samalkot	2,159	952	1,220	1,651	1,800	—	—	—	—	—	7,782
6.	Maruteru	410	720	922	852	1,120	—	—	—	—	—	4,024
7.	Anakapalle	812	1,285	1,191	1,062	753	—	—	—	—	—	5,103
8.	Coimbatore	405	386	572	480	20	—	—	—	—	—	1,863
9.	Tikkoti	—	—	—	—	—	1,435	2,353	1,704	—	—	5,492
10.	Marudur	—	—	817	869	469	—	—	—	—	—	2,155
Total.		11,823	11,938	14,010	13,212	15,601	3,660	5,322	6,784	4,672	—	37,022

## STATEMENT No. 2.

2. Number of seednuts procured for different nursery centres.  
The particulars of seednuts procured for the nursery centres are furnished in the following statement.

Sl. No.	Name of Nursery Centre	No. of seednuts procured in different years.										Total No. of seednuts procured.
		1948-49	1949-50	1950-51	1951-52	1952-53	1953-54	1954-55	1955-56	1956-57	1-7-57 to 31-8-57	
1.	Nileshwar	53,520	61,100	60,020	60,310	32,458	40,000	40,000	40,000	—	—	3,87,408
2.	Pattambi	59,720	61,697	60,000	60,118	24,314	—	—	—	—	—	2,65,849
3.	Pattukkottai	25,883	24,536	24,000	24,000	23,900	39,600	40,000	40,000	47,650	350	2,89,919
4.	Tindivanam	2,040	2,000	8,000	8,000	—	—	—	—	—	—	20,040
5.	Samalkot	28,588	24,624	24,211	24,000	35,915	—	—	—	—	—	1,37,338
6.	Maruteru	8,000	8,000	8,025	8,630	—	—	—	—	—	—	32,655
7.	Anakapalle	2,368	8,280	8,097	8,070	—	—	—	—	—	—	26,815
8.	Coimbatore	7,300	7,000	8,000	8,000	—	—	—	—	—	—	30,300
9.	Tikkoti	—	—	—	—	—	40,000	40,000	40,000	—	—	1,20,000
10.	Marudur	—	—	7,000	8,000	8,003	—	—	—	—	—	23,003
Seednuts procured at Badagara and Chowghat centres for three nurseries at Nileshwar, Pattambi and Pattukkottai												
		—	—	—	—	44,000	—	—	—	—	—	44,000
Total.		1,87,419	1,97,237	2,07,353	2,09,128	1,68,590	1,19,600	1,20,000	1,20,000	47,650	350	13,77,327



### STATEMENT No. 3.

No. of seednuts planted in the nursery in different years.

The particulars of planting seednuts in different years in different nurseries are furnished below.

Sl. No.	Name of the Nursery	Number of seednuts planted in different years.										Total
		1949	1950	1951	1952	1953	1954	1955	1956	1957		
		Nursery	Nursery	Nursery	Nursery	Nursery	Nursery	Nursery	Nursery	(Up to Nursery 31-8-1957)		
1.	Nileshwar	51,504	60,100	60,020	60,310	50,773	40,000	40,000	—	—	3,62,707	
2.	Pattambi	59,678	53,697	59,000	60,118	40,455	—	—	—	—	2,72,948	
3.	Coimbatore	7,985	7,950	8,000	8,000	937	—	—	—	—	32,872	
4.	Pattukkottai	24,000	24,536	24,000	24,000	42,112	40,000	40,000	40,000	48,000	3,06,648	
5.	Tindivanam	6,825	8,000	8,000	8,000	—	—	—	—	—	30,825	
6.	Samalkot	28,412	23,638	24,205	24,014	37,675	—	—	—	—	1,37,944	
7.	Maruteru	8,160	8,100	8,000	8,400	—	—	—	—	—	32,660	
8.	Anakapalle	5,076	8,242	8,087	8,036	—	—	—	—	—	29,441	
9.	Marudur	—	7,320	8,000	8,000	8,000	—	—	—	—	31,320	
10.	Tikkoti	—	—	—	—	—	40,000	40,000	—	—	80,000	
	Total	1,91,640	2,01,583	2,07,312	2,08,878	1,79,952	1,20,000	1,20,000	40,000	48,000	13,17,365	

Note: The particulars of planting of seednuts at Nileshwar and Tikkoti in 1956 Nursery were not furnished as these two centres got merged with Kerala on 1-11-1956, though procurement particulars for these two nurseries have been furnished as procured during 1955-56.

# STATEMENT No. 4.

Number of seednuts germinated with percentage of germination in each year.  
 Number of seednuts germinated in each year in each nursery are  
 The particulars of germination in each year in each nursery are  
 furnished in the following statement.

Sl. No.	Name of the Nursery	Number of seednuts germinated with percentage of germination											
		1949 Nursery				1950 Nursery				1951 Nursery			
		No. Planted	Ger- minated	Per- centage	No. Planted	Ger- minated	Per- centage	No. Planted	Ger- minated	Per- centage	No. Planted	Ger- minated	Per- centage
1.	Nileshwar	51,504	46,479	90.2	60,100	56,629	94.2	60,020	55,338	93.2	60,310	56,764	94.1
2.	Pattambi	59,678	55,158	92.5	53,697	50,306	93.7	59,000	55,403	93.9	60,118	56,174	93.5
3.	Coimbatore	7,985	7,589	95.0	7,950	7,494	94.3	8,000	7,520	94.0	8,000	7,497	93.7
4.	Pattukkottai	24,000	18,351	76.5	24,536	20,150	82.1	24,000	20,886	87.0	24,000	21,969	92.0
5.	Tindivanam	6,825	6,101	89.4	8,000	5,931	74.1	8,000	6,630	82.9	8,000	7,305	91.3
6.	Samalkot	28,412	24,718	87.0	23,638	21,801	94.6	24,205	22,646	93.6	24,014	22,536	93.2
7.	Maruteru	8,160	6,964	85.4	8,100	7,232	90.0	8,000	6,761	84.5	8,400	7,394	88.8
8.	Anakapalle	5,076	4,417	87.0	8,242	7,264	88.1	8,087	6,456	79.8	8,036	7,007	87.2
9.	Marudur	—	—	—	7,320	7,011	95.7	8,000	6,240	78.0	8,000	7,535	94.1
10.	Tikkoti	—	—	—	—	—	—	—	—	—	—	—	—



# STATEMENT No. 4. (Continued)

Number of seednuts germinated with percentage of germination in each year.

The particulars of germination in each year in each nursery  
are furnished in the following statement.

Sl. No.	Name of the Nursery	Number of seednuts germinated with percentage of germination											
		1953 Nursery			1954 Nursery			1955 Nursery			1956 Nursery		
		No. Planted	Ger-minated	Per-centage	No. Planted	Ger-minated	Per-centage	No. Planted	Ger-minated	Per-centage	No. Planted	Ger-minated	Per-centage
1.	Nileshwar	50,773	46,992	92.5	40,000	37,665	94.2	40,000	37,258	93.1	—	—	—
2.	Pattambi	40,455	38,560	95.3	—	—	—	—	—	—	—	—	—
3.	Coimbatore	937	898	95.8	—	—	—	—	—	—	—	—	—
4.	Pattukkottai	42,112	38,317	90.9	40,000	38,839	84.6	40,000	35,875	90.0	40,000	35,430	89.0
5.	Tindivanam	—	—	—	—	—	—	—	—	—	—	—	—
6.	Samalkot	—	—	—	—	—	—	—	—	—	—	—	—
7.	Maruteru	—	—	—	—	—	—	—	—	—	—	—	—
8.	Anakapalle	—	—	—	—	—	—	—	—	—	—	—	—
9.	Marudur	8,000	7,233	90.4	—	—	—	—	—	—	—	—	—
10.	Tikkoti	—	—	—	40,000	36,031	90.1	40,000	37,224	93.0	—	—	—

# STATEMENT No. 5.

Total number of seedlings for which indents were received.  
Particulars of indents received for all the nursery centres are furnished in the following statement.

Sl. No.	Particulars	1952 Nursery	1953 Nursery	1954 Nursery	1955 Nursery	1956 Nursery	Total.
1.	Indents received for the supply of coconut seedlings from all the coconut nurseries.	3,67,325	1,79,206	2,79,804	3,43,275	48,708	12,18,318

The particulars of indents received prior to 1952 nursery are not available.



## STATEMENT No. 6.

Number of selected coconut seedlings supplied in different years from different nurseries.  
The particulars of supply of seedlings from each nursery in different years are  
furnished below.

Sl. No.	Name of the Centre	Number of seedlings supplied in different years									Total
		1949	1950	1951	1952	1953	1954	1955	1956		
		Nursery	Nursery	Nursery	Nursery	Nursery	Nursery	Nursery	Nursery		
1.	Nileshwar	30,475	42,752	44,872	47,965	35,795	32,145	—	—	2,34,004	
2.	Pattambi	45,183	40,589	44,581	41,904	29,114	—	—	—	2,01,371	
3.	Coimbatore	6,768	6,302	6,208	6,040	—	—	—	—	0,25,318	
4.	Pattukottai	12,111	17,922	17,240	19,530	31,161	26,663	31,047	30,002	1,85,676	
5.	Tindivanam	5,648	5,365	6,920	6,153	—	—	—	—	0,23,156	
6.	Maruteru	5,905	6,470	6,024	—	—	—	—	—	0,18,399	
7.	Samalkot	17,877	19,068	18,878	—	—	—	—	—	0,55,823	
8.	Anakapalle	3,690	6,643	5,711	—	—	—	—	—	0,16,044	
9.	Marudur	—	6,587	4,451	7,091	—	—	—	—	0,18,129	
10.	Tikkoti	—	—	—	—	—	30,001	—	—	0,30,001	
Total		1,27,657	1,51,698	1,53,955	1,28,683	96,070	88,809	31,047	30,002	8,07,921	

NOTE: Taluk and district-war supply of seedlings, details regarding distribution of seedlings for underplanting and fresh planting and list of parties to whom 500 or more seedlings were supplied are not available, since most of the nurseries got merged with other States.

## APPENDIX XIV

### Secretary's Note

#### *Extension Scheme*

#### *Subject No. 38.*

1. Name of the scheme: Scheme for the establishment of a *Coconut nursery* in the northern part of *West Bengal*.
2. Location: *Cooch Behar*.
3. Object of the scheme: To distribute 4,000 quality seedlings annually.
4. Date of commencement of the scheme: 20-10-1954.
5. Date of termination of the present scheme: 19-10-1959.
6. Results achieved in brief: It is stated in the extension proposal that 5,836 seedlings were distributed under the scheme during 1955-56 and 1956-57. According to the progress reports for the years 1955-56 to 1957-58 furnished by the Director of Agriculture, West Bengal, 7,461 seedlings were distributed under the scheme during the 3 years 1955-56 to 1957-58 as against a target of 12,000 seedlings. It has been reported that there was no sowing during the year 1957-58 as administrative sanction for procurement of seednuts was not received in time.
7. Reasons for extension: There is a heavy demand for quality seedlings in the Cooch - Behar area. The



target for additional production of coconut under the II Plan was fixed on the assumption that this scheme also would continue to function up to the end of the II Plan period. In view of these considerations it is necessary to continue the scheme beyond 19-10-1959 upto the end of the II Plan period.

8. Duration of the extension: 20-10-1959 to 31-3-1961 (1 year, 5 months and 12 days).
9. Total cost of the extension under the following heads:
  - a. *Expenditure.*

Non-Recurring	Nil
Recurring	Rs. 8,120/- (round)
Share of the Committee (50%)	Rs. 4,060/-
Share of State Government (50%)	Rs. 4,060/-
  - b. *Receipts.*

Share of the Committee.	Receipts anticipated under the scheme have not been mentioned in the proposal.
Share of state Government.	
  - c. *Net cost*

	Rs. 8,120/-
Share of the Committee.	Rs. 4,060/-
Share of State Government	Rs. 4,060/-
10. Remarks of the Secretariat on the proposal
  - 1) The provisions made for expenditure under the scheme are on the existing basis and are in order.
  - 2) No mention has been made in the proposal about

the receipts anticipated under the scheme. The receipts that would accrue in 1960-61 as a result of selling the seedlings raised in the 1959 nursery have already been decided to be shared by the Committee and the State Government in the ratio of 40: 60 when the original scheme was sanctioned. But a sum of Rs. 2,000 may be expected to accrue in 1961-62 after the termination of the extension scheme from the sale of seedlings raised in the 1960 nursery. Although the sale of these seedlings may take place only after the termination of the scheme, the receipts will have to be shared by the Committee in the accepted proportion as the Committee is meeting its share of expenditure in raising the nursery during 1960-61. A sum of Rs. 20/- may also be anticipated from the sale of ungerminated seednuts.

3) It has been stated by the Director of Agriculture that the scheme may be continued on the existing terms and conditions, that is, the Committee meeting 50% of the recurring expenditure and taking 40% of the receipts. But according to condition No. 26 (a) of the



“General Conditions applicable to grants made by the Indian Central Coconut Committee” the Committee’s share of expenditure on nursery schemes has to be limited to  $33\frac{1}{3}\%$  of the total recurring expenditure for the 2nd five years of their operation. The receipts from the sale of seedlings during this period are to be shared by the Committee and the State Government in the same proportion as that in which the expenditure is shared.

On the basis of sharing the expenditure and receipts in accordance with condition No. 26 (a) of the General Conditions applicable to grants, the Committee’s share of expenditure and receipts will be of the order of Rs. 2707 and Rs. 673 respectively. The net expenditure to the Committee will thus be Rs. 2,034 only.

4) The State Government have not communicated their approval of the extension proposal.

The Committee may decide whether they would sanction the extension of the scheme from 20-10-1959 to 31-3-1961 at a net cost to the Committee not exceeding Rs. 2,034 in case the

West Bengal Government  
also approve of the proposal.

The subject may be  
considered first by the Agri-  
cultural Research and Deve-  
lopment Sub - Committee  
(Development Wing).

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*Scheme for the continuance of an Additional Coconut  
Nursery at Cooch-Behar in West Bengal.*

*Objective:*

The object of the scheme is to collect and plant 5,000 seednuts with a view to raise 4,000 quality seedlings annually for distribution amongst the coconut growers in the northern district of West Bengal.

*Period of Operation:*

The additional coconut nursery scheme at Cooch-Behar started functioning from October 20, 1954 and was financed jointly by the State Government and the Indian Central Coconut Committee on 50 : 50 basis.

The scheme is due to terminate on October 19, 1959.

*Results Achieved:*

*Seednuts and quality seedlings.*

The following nuts were procured and planted at the Cooch-Behar nursery in the years shown below:—

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Year	Procured.	No. of quality seedlings distributed.
1954-55	3,000 nuts	Nil *
1955-56	4,000 „	2,267
1956-57	5,000 „	2,569
1957-58	Nil **	„

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\* Seedlings were ready during 1955-56.

\*\* No seednuts could be procured due to late sanction.



The demand for seedlings in the Northern Districts has been so great that we could not meet the demand and the supply had to be made from Chandernagore Coconut Nursery.

*Total Expenditure Involved:*

50 p. c. of the cost involved is borne by the Indian Central Coconut Committee while the remaining 50 p. c. is being met by the State Government and the receipt is shared by State Government and Indian Central Coconut Committee on 60 : 40 basis.

Year	Total expenditure including pay and allowances	Remarks.
1954-55	Rs. 3,854-5-6	The scheme commenced from 20-10-54.
1955-56	Rs. 5,732-3-0	
1956-57	Rs. 6,167-5-3	
1957-58	Rs. 4,535.76 nP.	

*Staff:* The following staff were sanctioned under the Nursery scheme at Cooch-Behar.

1. One Field Assistant in the scale of Rs. 90-4-130.
2. One Chowkidar in the scale of Rs. 20-1/4-25.

*Programme of work:*

- 1) Collection of seednuts from selected mother palms which are heavy bearing and free from diseases.
- 2) Raising of quality seedlings on scientific basis.
- 3) Distribution of quality seedlings to coconut growers.

*Justification for continuance of the scheme until 1960-61.*

1. North Bengal is a very suitable area for cultivation of coconut and there is further scope for extension of coconut cultivation in the area. Further we are very deficit in this agricultural commodity.

2. There is very heavy demand for quality coconut seedlings and the farmers have realised the value of good quality seedlings because of our propaganda.

3. The target for production of coconut in terms of oil for West Bengal during the Second Five-Year Plan was fixed on the basis of the continuity of the Cooch-Bihar Nursery until the end of Second Plan Period.

In view of the above consideration it is proposed that the scheme should be extended upto the end of 2nd Five-Year Plan period i. e. untill 1960-61.

*Officer-in-charge:*

The scheme will be executed under the guidance of the Special Officer, Potatoes, West Bengal, who will be the drawing and disbursing officer of the scheme.

**Budget estimate for the period from October 20, 1959 to March 1960 and for 1960-61**

Name of the head	:20-10-59 to 31-3-60	1960-61.
<i>Pay of Establishment</i>		
1. One Field Assistant in the scale of Rs. 90-4-130	:Rs. 482.56	:Rs. 1289.56 nP.
2. One Chowkidar in the scale Rs. 20- $\frac{1}{4}$ -25	:Rs. 87.75	:Rs. 240.00
<i>Allowances and Honoraria:</i>		
Dearness Allowance	:Rs. 285.19	:Rs. 780.00
Additional Dearness allowance	:Rs. 43.8	:Rs. 120.00
Cash allowance	:Rs. 52.62	:Rs. 144.00
Compensatory allowance	:Rs. 8.75	:Rs. 24.00
Travelling allowance	:Rs. 200.00	:Rs. 500.00
<i>Contingencies:</i>		
1. Preparation of seed bed	:Rs. Nil	:Rs. 250.00
2. Nursery expenses	:Rs. 400.00	:Rs. 1,100.00
3. Cost of seednuts	:Rs. Nil	:Rs. 1,700.00
4. Incidental Charges	:Rs. Nil	:Rs. 300.00
5. Office contingencies	:Rs. 30.00	:Rs. 80.00
Total	:Rs. 1,590.68	:Rs. 6,527.56 nP.



## APPENDIX XV

### Secretary's Note

*Subject No. 40.* Parasite Breeding Stations in Kerala State - Review of work of.

At the last meeting of the Committee, when the progress report on the parasite breeding stations in Kerala State was considered, Dr. E. S. Narayanan, Head of the Division of Entomology, Indian Agricultural Research Institute, New Delhi, had observed that the experiments at the Stations had been carried out in an empirical way without much regard to the degree of infestation and the number of parasites required to check the infestation and conclusions on the control of the pest had been arrived at without sufficient data to back the conclusions. The President of the Committee had then suggested that Dr. Narayanan might visit the parasite breeding stations in Kerala and submit to the Committee a report on their work, and the suggestion was accepted by the Committee (Vide Sub. No. 35 of the proceedings of the 25th meeting).

Dr. Narayanan accordingly visited the stations in November-December 1958 and has submitted a report for the Committee's consideration. A copy of that report is appended to this note. As may be seen from it, Dr. Narayanan is of the view that the money now being spent on the stations is a waste. He has, therefore, recommended that the stations may be re-organised and has offered the following suggestions in this regard:

1. The existing six stations may be run by the Central Coconut Research Station, Kayangulam, and the following staff may be provided for each station:-

One Graduate Entomology Assistant.

Two Field Assistants (Matriculates)

Two Laboratory Attendants.

2. A new parasite breeding station may be set up at Trichur.

3. The Central Coconut Research Station, Kayangulam, should carry out fundamental research work on

the various aspects of the biological control of *Nephantis serinopa*.

4. There should be a regular survey of infested areas and the natural parasitism in those areas should be studied. The increase in parasitism after liberation of parasites should also be studied.

5. Dr. Chandy Kurian, Entomologist and Shri J. Antony, Research Assistant in Entomology at the Central Coconut Research Station, Kayangulam may be trained for a period of 3 months at the Indian Agricultural Research Institute, New Delhi, in the general principles of parasitism, biological control and the technique of breeding parasites.

In this connection, it may be pointed out that at the 5th meeting of the Central Supervisory Body for the implementation of the coconut schemes under the Second Five-Year Plan held at Bombay on the 15th December 1958, the undersigned pointed out that the progress in some of the parasite breeding stations in Kerala State was reported to be unsatisfactory. The Director of Agriculture, Kerala State then stated that the technical supervision of the stations was vested in the Entomologist of the Agricultural College at Vellayani and that he (the Entomologist) had not sufficient time to supervise the work of the station. He, however, promised that all possible steps would be taken to improve the work of the stations.

The Committee may now decide whether the recommendations made by Dr. E. S. Narayanan regarding the re-organisation of the parasite breeding stations in Kerala may be accepted.

The subject may be considered first by the Agricultural Research and Development Sub-Committee (Development Wing).

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*Report on the working of the Parasite Breeding Stations in Kerala State for the Biological control of the black headed caterpillar *Nephantis serinopa* Meyr, (Lepidoptera cryptophasidae).*

By

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*Introduction*

With about one and a half million acres under coconut, India has the second largest coconut growing area in the world yielding about 3,400 million nuts annually. Yet our production falls short of our requirements by about 25 per cent. One of the main causes for this deficiency is the serious damage caused by insect pests.

Next only in importance to the rhinoceros beetle *Oryctes rhinoceros* L. (Coleoptera : Dynastidae) *Nephantis serinopa* is the most serious pest in all the coconut growing areas stretching from Konkan right down to the Cape Comorin in the West, from South Madras to Northern Sircars and Orissa and Bengal in the East. The pest is fortunately absent in the Mysore plateau though at elevations below 1,500 feet the pest has sometimes been found to cause some damage. The black pale grey caterpillars of the moth cause extensive damage to the coconut fronds, often times bringing about a steep fall in the production of nuts. It also causes the nuts to fall from the trees when they are still young and immature. The larvae feed on the lower surface of the leaves feeding on the green parenchyma. When the attack is serious the leaves turn grey and the infested trees have a scorched appearance – occasionally the pest has been observed to attack even green nuts.

**Insect parasites of *Nephantis serinopa* and their utilisation for the control of the pest.**

Of the principal methods of insect control, namely, the mechanical, the cultural, the physical, the chemical, the biological, and the legislative, the biological basis of

insect control plays an important role in keeping the pest under check. The caterpillars and pupae of the pest are attacked by a number of parasites. There are six species of parasites belonging to five different families of the Order Hymenoptera as given below:

**Larval parasites:**

1. *Apanteles taragamae* Vier. (Hymenoptera :  
Braconidae)
2. *Bracon brevicornis* Wesm. (Hymenoptera :  
Braconidae)
3. *Perisierola nephantidis* Mues. (Hymenoptera :  
Bethylidae)
4. *Elasmus nephantidis* Roh. (Hymenoptera :  
Elasmidae)

**Pupal parasites:**

1. *Stomatoceras sulcatiscutellum* Girault  
(Hymenoptera : Chalcididae)
2. *Trichospilus pupivora* Ferr. (Hymenoptera :  
Eulophidae)

There can be little doubt that but for the activities of these parasites, the damage caused by *Nephantis* to the coconut palm would have been far more severe than what is today. It will be seen that there are four species of parasites that attack the larvae of the pest and two species that attack the pupae. Those larvae that may escape attack by the larval parasites may be attacked by the pupal parasites. This is what is known as the sequence theory of parasitic control which is considered to be most effective. An ideal sequence theory would have been if the eggs had also been parasitised. But in the case of *Nephantis* no egg parasites have been recorded so far. Also it may be stated that though there are four different species of larval parasites, no two species have been bred from the same host. In other words the phenomena of multiparasitism has not been observed in this parasite complex. The prevalence of multiparasitism would have meant severe competition among the species and the consequent death of one or more species. So the behaviours of these different species do not bring



about a conflict among themselves and so can be considered favourable from the point of view of the biological control of the pest. These observations hold good for the two pupal parasites also.

**Parasite breeding stations in the Kerala State  
and the biological control work carried  
out by them.**

In view of what has been said in the fore-going paragraph it is not surprising that the biological control of the pest is being given a fair trial in Kerala. There are six parasite breeding stations in the State. These are located at (1) Vellayani (Trivandrum), (2) Quilon, (3) Kottayam, (4) Vytilla (Ernakulam), (5) Kozhikode and (6) Kasaragod. I visited all the breeding stations and had detailed discussions with the staff. Each of the stations except Kasaragod has the following staff:

One Laboratory Assistant

One Field Assistant

Besides these, they get some help from one or two maistries who may be compared to laboratory attendants. The Laboratory Assistant was a matriculate while the field assistant was not. The Field Assistant had studied up to the middle school only. Only at Kasaragod there was a graduate entomology assistant in charge of the work and this station was relatively better than others. I was astonished to hear at every station, from the assistants that they were not at all satisfied with the kind of work that they were carrying out, that they had inadequate laboratory facilities, that they had very little T. A. allotment and that the contingencies were miserably inadequate. So they told me that they were unable to put forth their best. I heard the same story from the Government Entomologist at Trivandrum who was technically in charge of the whole work. The work carried out at all the stations was purely of an empirical nature. There was no plan whatsoever. They simply collected the pupae of *Nephantis* from the coconut leaves, parasitised these pupae with Eulophid parasites, and liberated them in the coconut groves of people who wrote to these people to liberate parasites. There

was no survey to assess the intensity of *Nephantis* infestation, the extent of natural parasitism that was already there and the increased parasitism that resulted from the liberations that were made. This was the case in all the centres. The basis of the utilisation of parasites in biological control work was a thorough study of the bionomics, biology, the prolificacy, the longevity and ecology of the parasites. None had any knowledge on any of these aspects, so necessary for successful biological control work. No larval parasites were bred and liberated except during certain months March, April, May and June at Trivandrum and throughout the year at Kasaragod. At Quilon they were breeding on an average 300 Bethylids in a month. When there were four larval parasites it was unfortunate that except Bethylids, and this also only in three centres, no attempt was made to breed the other three species of parasites. No attempt also was being made to breed the parasites on alternate hosts except at Trivandrum, to a very little extent at Quilon and to some extent at Kasaragod. I was informed that 60,000 Eulophids were the minimum target for each station. If properly done, this target is modest and to breed these numbers is the easiest thing for an assistant who has some elementary knowledge of the breeding of parasites. Even this target was not reached in many centres. For instance, at Calicut the figures from October 1957 to November 1958 were as follows:

1957	October	...	Nil
	November	...	2300
	December	...	5200
1958	January	...	9800
	February	...	11600
	March	...	6100
	April	...	800
	May	...	10889
	June	...	10200
	July	...	13700
	August	...	23900



September	...	17000
October	...	61000
November	...	18000

It can be seen and appreciated how inadequate the number of parasites bred are. By a strange coincidence I did not see more than 500-1000 parasites in any of the six stations. I was told that the parasites had just been liberated before my arrival.

### **Co-ordination of work between the Coconut Research Station and the Department of Agriculture, Trivandrum.**

I was surprised to find that there was no co-ordination of work between these various stations that were under the Director of Agriculture, Kerala State and the Entomology Section of the Kayangulam Research Station. If there had been some co-ordination the work would have gone on better. The Entomologist at Kayangulam had not even visited some of the stations and when asked for the reason, Dr. Kurian, the Entomologist, frankly told me that his visits might be misunderstood and so he did not visit the stations. Dr. Kurian is a highly qualified entomologist and his advice would have been of value to these parasite breeding stations.

### **Recommendations for the re-organisation of stations.**

I am of opinion that the money spent on these stations is a waste. I am further of opinion that the Kayangulam Research station should run these centres. Each centre should have the following staff:

- One Graduate Entomology Assistant
- Two Field Assistants (Matriculates)
- Two Laboratory attendants

I recommend that there may be another parasite breeding centre at Trichur. The area to be covered by each centre is large and Trichur will be able to cater to the needs of South Malabar coconut growers. All these stations should be under the technical supervision of

the Entomologist of the Kayangulam Research Station and the administrative supervision of the Director of that station.

### Programme of Work.

Kayangulam Research Station should carry out fundamental research work, such as nutrition, fecundity, longevity, viability and effectiveness of parasites, host selection experiments to find out what species of parasites prefers which stage of larval host etc. In addition to these studies I may specifically suggest the following three items of research:

(1) *Stomatoceras sulcatiscutellum* Gir. has been found to be of much importance in the natural check of the pest *Nephantis serinopa* Meyr. However, earlier laboratory methods have failed to breed this parasite on alternate hosts. Efforts should be made to breed this parasite. This has a long flight range and can withstand high temperature and humidity. Conservation of the parasites in localised areas will enhance the value of this parasite. As this parasite is known to be hyperparasitised by a eurytomid, great care should be exercised before releasing the field collected materials.

(2) *Apanteles taragamae* Vier has been functioning as an efficient check on *Nephantis* all over the east coast districts from Vizagapatnam down to South Arcot and Salem. The parasite introduced to the west coast area in 1924-25, successfully established itself. It was also observed that a few secondary parasites impaired the activity of the primary to some extent. The *Apanteles* sp. has not been mass bred in the laboratory. With our present knowledge of the breeding technique of the genus it may be possible to breed the parasite in the laboratory on some alternate hosts.

(3) *Trichospilus pupivora* Rohwar, has been the best parasite of *Nephantis*. The parasite is prolific and is not subjected to hyper-parasitism. It is stated that in the east coast dry period extends from May to September and the temperature may rise upto 100°F. The literature shows that the parasite can breed and survive at an optimum temperature of 80° F and 90 to 95% R. H.



In the West coast the dry months are March to May and the temperature goes beyond 95 F and Relative Humidity goes down to 50%. The pest is active from January to May, and it attains its peak activity in the months of April and May, a period which is not at all congenial for the parasites to multiply in nature. The laboratory reared parasites when liberated cannot acclimatise themselves to the dry hot climatic complex. It is suggested that a strain which could breed and multiply under low humidity and shows tolerance to high temperature should be developed. This is possible by mass selection and breeding.

### Stations

There should be a regular survey of infested areas and the natural parasitism in these areas should be studied by the examination of samples with the help of a statistician. The population of pest per unit area should be similarly studied. After liberations of parasites the increase in parasitism should be studied. If there is no significant increase the population of parasites should be increased by more liberations. Some experiments should be carried out with control and experimental plots in order to assess the utility of the liberations. Hundreds of thousands of parasites on alternate hosts should be bred. If insecticidal operations are carried out they should be so planned as not to kill the beneficial parasites. The insecticidal methods should be complimentary to the biological method of control and *vice versa*. This is the recent trend in the chemical and biological control work in the United States.

### Training of Personnel

If this programme is acceptable Dr. Kurian and Sri. Antony may be sent to the Division of Entomology, Indian Agricultural Research Institute for training for three months to study the general principles of parasitism and biological control and to study the technique of breeding parasites.

### Conclusion

If the suggestions and recommendations mentioned above are accepted and the technical programme outlined

carried out there is a fair chance for the success of biological control work in Kerala. I found ample evidence that when there were no parasites, the pest population shot up and if it can be proved that if the increase in the pest population is due to the absence of its natural enemies then the logic of the method of biological control is unassailable.

### Acknowledgement

Dr. Kurian, the Entomologist and a Laboratory attendant of the Coconut Research station accompanied me in the tour. I wish to express my thanks to the Director of the Coconut Research station and the Director of Agriculture, Kerala for the help and assistance they rendered me in connection with this visit.

#### Parasite Breeding Station, Trivandrum

1. <i>Pay of Staff</i>	1958-59	1959-60	1960-61	Total
Laboratory				
Assistant 1	887	944	824	2,655
Field Assistant 1	632	664	590	1,886
2. Dearness Allowance	672	672	560	1,904
3. Dearness Pay and Special D. A.	264	264	220	748
4. T. A.	625	625	525	1,775
5. Contingencies	200	200	168	568
Total	3,280	3,369	2,887	9,536
Committee's share 33 $\frac{1}{3}$ %	1,093	1,123	962	3,178

#### Parasite Breeding Station, Quilon

1. <i>Pay of Staff</i>	1958-59	1959-60	1960-61	Total
		(1-4-'60 to 31-1-'61)		
	Rs.	Rs.	Rs.	Rs.
Laboratory				
Assistant 1	1,066	1,075	974	3,055
Field Assistant 1	632	664	590	1,886
2. Dearness Allowance	672	672	560	1,904
3. Dearness Pay and Special D. A.	264	264	220	748



4.	T. A.	625	625	525	1,775
5.	Contingencies	200	200	168	568
	Total	3,399	3,500	3,037	9,936
	Committee's share 33 $\frac{1}{3}$ %	1,133	1,167	1,012	3,312

### Parasite Breeding Station, Kottayam

1.	<i>Pay of staff</i>	1958-59	1959-60	1960-61	<i>Total</i>
		Rs.	Rs.	Rs.	Rs.
	Laboratory				
	Assistant 1	887	944	824	2,655
	Field Assistant 1	585	617	520	1,722
2.	Dearness Allowance	672	672	560	1,904
3.	Dearness Pay and Special D. A.	264	264	220	748
4.	T. A.	625	625	525	1,775
5.	Contingencies	200	200	168	568
	Total	3,233	3,322	2,817	9,372
	Committee's share 33 $\frac{1}{3}$ %	1,078	1,107	939	3,124

### Parasite Breeding Station, Vyttila

1.	<i>Pay of Staff</i>	1958-59	1959-60	1969-61	<i>Total</i>
				(1-4-'60 to 31-1-'61)	
		Rs.	Rs.	Rs.	Rs.
	Laboratory				
	Assistant 1	1,006	1,075	974	3,055
	Field Assistant 1	632	664	590	1,886
2.	Dearness Allowance	672	672	560	1,904
3.	Dearness Pay and Special D. A.	264	264	220	748
4.	T. A.	625	625	525	1,775
5.	Contingencies	200	200	168	568
	Total	3,399	3,500	3,037	9,936
	Committee's share 33 $\frac{1}{3}$ %	1,133	1,167	1,012	3,312

**Statement of expenditure for the parasite breeding station Kozhikode for  
the period 21-10-1957 to 20-10-1961 (Second Five-Year Plan Scheme).**

the period 21-10-1957 to 20-10-1961									
Items of Expenditure.	For the pe- riod from 21-10-'57 to 31-3-'58.	For the pe- riod from 1-4-'58 to 31-3-'59	For the pe- riod from 1-4-'59 to 31-3-'60.	For the pe- riod from 1-4-'60 to 31-3-'61.	For the pe- riod from 1-4-'61 to 20-10-'61.	Total.	Remarks.		
	Rs.	Rs.	Rs.	Rs.	Rs.				
<b>A. Establishment Charges.</b>									
1. Laboratory Assistant (1) (Rs. 40-3-55-4-75-EB-5-120).	356	824	872	925	532	3,509			
2. Field Assistant (1) (Rs. 40-3-55-4-75-EB-5-100).	240	588	624	660	389	2,501			
Dearness Pay.	53	120	120	120	67	480			
Dearness Allowance.	272	672	672	672	373	2,661			
Special Dearness Allowance.	64	144	144	144	80	576			
Travelling Allowance.	600	1,000	1,000	1,000	400	4,000			
Total.	1,585	3,348	3,432	3,521	1,841	13,727			
<b>B. Contingencies.</b>									
Recurring: Office rent and other miscellaneous charges.	400	1,000	1,000	1,000	600	4,000			
Non-recurring: Laboratory Equipment and Furniture.	—	1,000	500	—	—	1,500			
Total.	400	2,000	1,500	1,000	600	5,500			
Grand Total.	1,985	5,348	4,932	4,521	2,441	19,227			

The Committee meets the entire expenditure.



## KASARAGOD STATION.

Details of estimated expenditure for two years from  
4-12-1958, of the parasite breeding station  
Kasaragod.

Details of Expenditure.	State Government's Share 66 $\frac{2}{3}$ %.	Com- mittee's Share 33 $\frac{1}{3}$ %.	Total Expendi- ture.
	Rs.	Rs.	Rs.
<b>Recurring Charges.</b>			
<b>Pay and allowances of establishment.</b>			
1. Pay of one Entomology Assistant in the scale of Rs. 125-10-225 at Rs. 125 P. M.	2,000	1,000	3,000
2. Pay of one Field-man in the scale of Rs. 40-100 at Rs. 63 P. M.	1,008	504	1,512
3. Pay of 3 mazdoors in the scale of Rs. 25-35 at Rs. 25 P. M.	1,200	600	1,800
4. Dearness Pay to Entomology Assistant, Field-man and 3 mazdoors at Rs. 5 P. M. each.	400	200	600
5. Dearness Allowance to Entomology Assistant at Rs. 28 P. M. Field-man at Rs. 28 P. M. and 3 mazdoors at Rs. 20 P. M.	1,856	923	2,784
6. Special Dearness Allowance to Entomology Assistant at Rs. 5 P. M. Field-man at Rs. 5 and 3 mazdoors at Rs. 7.	496	248	744
7. Travelling Allowance to Entomology Assistant, Field-man and mazdoors at Rs. 165 P. M.	2,640	1,320	3,960

### Contingencies.

1. Office & Laboratory rent at Rs. 30.	720	—	720
2. Laboratory and sundry expenditure.	267	133	400

### Non-recurring Charges.

Apparatus and materials.	1,200	—	1,200
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Total.	11,787	4,933	16,720
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Total Expenditure Rs. 16,720.

Committee's share Rs. 4,933.

State Government's share. Rs. 11,787.

## APPENDIX XVI

### Secretary's Note

#### *Extension Scheme*

#### *Subject No. 41*

1. Name of the Scheme: Scheme for the establishment of a zonal parasite breeding station for the biological control of *Nephantis serinopa* at Razole, Andhra Pradesh.
2. Location: Razole in East Godavari District.
3. Object of the scheme: To breed parasites and liberate them in coconut gardens in the Godavari districts affected by the coconut pest, *Nephantis serinopa*.
4. Date of commencement of the scheme: 1-9-1952.
5. Date of termination of the present scheme: The scheme expired on 31-3-1958.



6. Results achieved in brief: Five parasites namely, *Microbacon brevicornis*, *Elasmus nephantidis*, *Perisierola nephantidis*, *Trichospilus pupivora* and *Trichogramma* were reared at the station. During the period 1-9-1952 to 31-3-1958, a total number of 6,39,37,202 parasites were reared at the station out of which 5,15,73,028 parasites were released.
7. Reasons for extension: A parasite breeding station has already been functioning at Razole since 1-9-1952. The Committee's sanction for continuing the station expired on 3-8-1956. It was, however, suggested to the Andhra Pradesh Government to continue the station till one of the two parasite breeding stations sanctioned under the II Five-Year Plan was located at Razole so that there should not be any interruption in the working of the scheme. The scheme therefore continued to function till 31-3-1958. The station sanctioned under the II Five-Year Plan started on 1-4-1958 at Razole.
8. Duration of the extension: 1-9-1956 to 31-3-1958 (one year and seven months).
9. Total cost of the extension under the following heads:
- a) **Expenditure:**
- |               |                |
|---------------|----------------|
| Non-recurring | Nil.           |
| Recurring     | Rs. 13,561.77. |

Share of the Com-  
mittee  
Share of the State  
Government

} The Government of Andhra Pradesh have forwarded a statement of expenditure for Rs. 13,561.77 being the actual cost of the above scheme for the period 1-9-1956 to 31-3-1958, and suggested that the entire amount excluding the expenditure for office rent and apparatus might be shared equally between the Committee and the State Government. But according to the "General Conditions applicable to Grants made by the Indian Central Coconut Committee", the Committee's share of the recurring expenditure should be limited to 50% during the first five years and to 33½% during the next five years. The scheme under consideration started functioning on 1-9-1952 and its first five-year period terminated on 31-8-1957. Therefore, the Committee could share 50% of the recurring expenditure on the scheme only upto 31-8-1957. The expenditure from 1-9-1957 to 31-3-1958 (seven months) should be shared between the Committee and the Andhra Pradesh Government in the proportion of 1:2. The State Government have been requested to prepare and forward to the Committee a modified statement of cost of the scheme on the above



basis. Their reply is awaited. Hence the shares of the Committee and the State Government are not furnished.

**b) Receipts:**

Share of the Committee Nil.

Share of the State

Government

Nil.

10. Remarks of the Secretariat on the proposal      The scheme has been functioning for a period of one year and seven months from 1-9-1956 to 31-3-1958 after the expiry of the period sanctioned by the Committee. The Committee may agree to finance the scheme during the above period on condition that the expenditure is shared by the State Government and the Committee in accordance with the General Conditions applicable to grants made by the Committee.

The subject may be considered first by the Agricultural Research and Development Sub-Committee (Development Wing).

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## Statement of Expenditure From 1-9-56 to 31-3-'57

1	Particulars	Actuals	Calculated on the basis of actual emoluments	
			Share of I. C. COC. C	Share of Government
2	3	4	5	
	Rs.	Rs.	Rs.	
<b>I. Pay of Establishment.</b>				
1. Pay of Shri Edwin Dharmaraju, Entomology Assistant at Rs. 140/- p. m. from 1-9-1956 to 18-10-56	224-0-0	112-0-0	112-0-0	
2. Pay of Sri C. Seshagiri Rao, Entomology Assistant at Rs. 100/- p. m. from 1-11-1956 to 31-3-57	400-0-0	200-0-0	200-0-0	
3. Pay of Sri P. Subbarao, Fieldman at Rs. 59/- p. m. from 1-9-1956 to 31-3-1957	413-0-0	206-8-0	206-8-0	
4. Pay of Sri S. Venkataswamy, Fieldman, at Rs. 59/- p. m. from 1-9-1956 to 31-3-1957	413-0-0	—	413-0-0	
<b>Total</b>	<b>1,450-0-0</b>	<b>518-8-0</b>	<b>931-8-0</b>	
<b>II. Dearness Allowance.</b>				
1. Dearness allowance of Sri Edwin Dharmaraju, Entomology Assistant at Rs. 33/- p. m. from 1-9-1956 to 18-10-1956	52-13-0	26-6-6	26-6-6	
2. D. A. of Sri C. Sheshagiri Rao at Rs. 24/- p. m. from 1-11-1956 to 31-3-1957	96-0-0	48-0-0	48-0-0	



3.	D. A. of Sri P. Subbarao at Rs. 24/- p. m. from 1-9-1956 to 31-3-1957	154-0-0	77-0-0	77-0-0
4.	D. A. of Sri S. Venkata- swamy at Rs. 24 p. m. from 1-9-'56 to 31-3-'57	154-0-0	—	154-0-0
	Total	<u>456-13-0</u>	<u>151-6-6</u>	<u>305-6-6</u>

III. *Travelling allowance and H. R. A.*

1.	T. A. of Sri Edwin Dharmaraju, Entomology Assistant	48-8-0	24-4-0	24-4-0
2.	T. A. of Sri C. Shesha- giri Rao, from 1-11-'56 to 31-3-1957.	210-4-0	105-2-0	105-2-0
3.	T. A. of Sri P. Subba- rao from 1-9-1956 to 31-3-1957	232-11-0	116-5-6	116-5-6
4.	T. A. of Sri S. Venkata- swamy from 1-9-1956 to 31-3-1957	229-11-0	—	229-11-0
	Total	<u>721-2-0</u>	<u>245-11-6</u>	<u>475-6-6</u>

5.	H. R. A. of Sri E. Dharmaraju, at Rs. 3/- p. m. from 1-9-1956 to 18-10-1956	4-13-0	2-6-6	2-6-6
6.	H. R. A. of Sri C. Sheshagiri Rao at Rs. 3/- p. m. from 1-11-1956 to 31-3-1957	12-0-0	6-0-0	6-0-0
7.	H. R. A. of Sri P. Subba- rao, at Rs. 3/- p. m. from 1-9-1956 to 31-3-1957	21-0-0	10-8-0	10-8-0
8.	H. R. A. of Sri S. Venkataswamy at Rs. 3/- p. m.	21-0-0	—	21-0-0
	Total	<u>779-15-0</u>	<u>264-10-0</u>	<u>515-5-0</u>

#### IV Contingencies.

a) Recurring expenditure excluding office rent and apparatus and materials	1,603-14-0	801-15-0	801-15-0
b) Office rent and apparatus and materials	375-8-0	—	375-8-0
Total	1,979-6-0	801-15-0	1,177-7-0

#### Abstract

I. Pay of Establishment	1,450- 0-0	518- 8-0	931- 8-0
II. Dearness Allowance	456-13-0	151- 6-6	305- 6-6
III. T. A. and O. C. A	779-15-0	264-10-0	515- 5-0
IV. Contingencies	1,979- 6-0	801-15-0	1,177- 7-0
Total	4,666- 2-0	1,736-7-6	2,929-10-6

### Statement of Expenditure from 1-4-1957 to 31-3-1958 relating to the Parasite Breeding Station, Hyderabad.

1	Particulars	Actual Pay	Calculated on the basis of actual emoluments	
			Share of I. C. COC. C.	Share of State Government
2		3	4	5
		Rs. nP.	Rs. nP.	Rs. nP.
<i>Establishment</i>				
1.	Pay of Sri C. Seshagiri Rao, Entomology Assistant @ Rs. 100 p. m. from 1-4-57 to 31-8-58.	1,200.00	600.00	600.00
2.	Increment of Sri E. Dharmaraju, Entomology Assistant from May 1956 to September 1956.	38.25	19.13	19.12



3. Pay of Sri P. Subbarao, Fieldman @ Rs. 59 p.m. from 1-4-57 to 31-3-58.	708.00	354.00	354.00
4. Pay of Sri S. Venkataswamy, fieldman at Rs. 59 p. m. from 1-4-57 to 31-3-'58	708.00	—	708.00
Total	<u>2,654.25</u>	<u>973.13</u>	<u>1,621.12</u>

*Dearness Allowance*

1. D. A. of Sri C. Seshagiri Rao from 1-4-57 to 31-3-58.	288.00	144.00	144.00
2. Increment of Sri E. Dhar- maraju, from May 1956 to September 1956	3.81	1.90	1.91
3. D. A. of Sri P. Subbarao from 1-4-57 to 31-3-58.	330.00	165.00	165.00
4. D. A. of Sri Venkataswamy from 1-4-57 to 31-3-58.	330.00	—	330.00
Total	<u>951.81</u>	<u>310.90</u>	<u>640.91</u>

*T. A. & O. C. A.*

1. T. A. of Sri C. Sheshagiri Rao from 1-4-57 to 31-3-58	549.31	274.65	274.66
2. T. A. of Sri. P. Subbarao from 1-4-57 to 31-3-58.	367.89	183.94	183.95
3. T. A. of Sri. S. Venkata- swamy from 1-4-57 to 31-3-58.	368.44	—	368.44
4. H. R. A. of Sri. C. Shesha- giri Rao from 1-4-57 to 31-3-58.	36.00	18.00	18.00
5. H. R. A. of Sri P. Subba Rao from 1-4-1957 to 31-3-58.	36.00	18.00	18.00
6. H. R. A. of Sri S. Venkata- swamy from 1-4-57 to 31-3-58.	36.00	—	36.00
Total	<u>1,393.64</u>	<u>494.69</u>	<u>899.05</u>

*Contingencies*

1. Recurring expenditure excluding office rent and apparatus and materials.	3,085.20	1,542.60	1,542.60
2. Office rent and apparatus and materials	814.63	—	814.63
Total	<u>3,899.83</u>	<u>1,542.60</u>	<u>2,357.23</u>

*Abstract*

1. Pay of Establishment	2,654.25	973.13	1,681.12
2. Dearness Allowance	951.81	310.90	640.91
3. T. A. and O. C. A.	1,393.64	494.59	899.05
4. Contingencies	3,899.83	1,542.60	2,357.23
Grand Total	<u>8,899.53</u>	<u>3,321.22</u>	<u>5,578.31</u>

*Less under 4 contingencies*

1. Abatement of charges through Challan No.1089 dated 9-11-57 (D. C. Bill No. 21 of October 1957)	3.87		
2. Recovery of excess amount drawn through Challan No. 367 dated 24-1-58 (Vide D. C. Bill No. 14 of 1957)	0.02		
Total	<u>3.89</u>	<u>0.01</u>	<u>3.88</u>

Net Expenditure under contingencies	3,895.94	1,542.59	2,353.35
Total Expenditure	<u>8,895.64</u>	<u>3,321.21</u>	<u>5,574.43</u>



# Abstract of expenditure and receipts of Parasite Breeding Station, Razole from 1-9-1956 to 31-3-1957.

Name of the scheme and basis of appointment G. O. in which sanctioned and D. A.'s Endorsement No. and date.	Head of account in which expenditure is drawn	Actual expenditure under various head of accounts is as printed in Treasury accounts	Total receipts realised from out of the scheme	Share of the I. C. C.O.C. C.		Share of the Government	
				Expendi- ture	Rece- pts	Expendi- ture	Rece- pts.
Scheme for the est- abishment of zonal parasite breeding station for biological control of Nephantis serinopa at Razole east Godavary District 1) Sanctioned from 1-9- 1956 to 31-10-1956 in Memo No. 118707-p- 55-14 dated 28-8-1956 Rev. Dept. Govt. of Andhra Pradesh Dire- ctor's Endorsement No. Res. I.4. 1803/56 dated 30-8-1956.	40-D Agriculture. Agricultural De- monstration and propaganda in- cluding public exhibitions and fairs I ordinary areas. Scheme for the establi- shment of Zonal Parasite Breed- ing Station for the Biological control of <i>Nephantis serinopa</i> .	Pay of Officer Pay of Establi- shment Rs. 1,450-0-0 Dearness allowance 456-13-0 T.A. O.C.A. 779-15-0 Contingen- cies 1,979-6-0 Total 4,666-2-0	N I L	518-8-0 151-6-0 264-10-0 801-15-0 1,736- 7-6	N I L	931-8-0 305-6-6 515-5-0 1,177-7-0 2,929-10-6	N I L

2) Sanctioned from  
1-11-56 to 31-12-56 in

memo No. 2338B. III/  
56-23 dated 24-12-  
'56 from Government  
of Andhra Pradesh,  
Agricultural Depart-  
ment, Director's Endt.  
No. Res. 1-4-1803/55  
dated 9-1-1957.

3) Sanctioned from  
1-1-57 to 31-3-57 in  
memo No. 2338 B III/  
56-28 dated 31-1-57 of  
Government of An-  
dhra Pradesh Agricul-  
tural Department Di-  
rector's Endt. No. Res.  
I. 4. 1803/55 dated  
9-2-57.

I. C. COC. C. : Government  
Expenditure 50 : 50

Excluding on account of  
office rent and one additional  
fieldman.



# Abstract of Expenditure and Receipts of Parasite Breeding Station, Razole

From 1-4-1957 to 31-3-1958.

Name of the Scheme and basis of apportionment Expenditure. G.O in which mentioned and Director's Endt. No. and date.	Head of account in which the expenditure is debited	Actual expenditure under various head of accounts printed in Treasury accounts	Total receipts realised out of scheme	Share of Committee Expenditure	Share of Government Receipt
1	2	3	4	5	6 7 8
Scheme for the est-40 - Agril.Demonstration of zonal "C" Agril. breeding station and promotion for biological control of Neophantis serinopa at Razole.	Agril.Demonstration of zonal "C" Agril. breeding station and promotion for biological control of Neophantis serinopa at Razole.	Pay of Officer Pay of Establishment - Dearness Allowance T.A. & O.C.A. Contingencies and other charges	Rs. np. 2,654.25  951.81 1,393.64 3,899.83	Rs. np. N 973.13 I 310.90 L 494.59 1,542.60	N 1,681.12 N I 640.91 L 899.05 2,357.23
Interim sanction given for the continuation of the parasitic breed-	for establishment of Zonal parasitic breed-	Total	8,899.53	3,321.22	5,578.31

I. C. COC : Govt. Razole.

Expenditure	50	:	50
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1	2	3	4	5	6	7	8
Except an account of office rent and em- ployment of addi- tional fieldman							
		<i>Less under contingencies:</i>					
		Abatement of Charges thr-					
		ough Challan No. 1089 dated					
		9-11-57 and recovery of ex-					
		cess amount drawn through					
		Challan No. 367 dated 24-1-	3.89	0.1		3.88	
		1958 (under contingencies)					
		Total Net Expenditure		3321.21	5574.43		



## APPENDIX XVII

### Secretary's Note

#### *New Scheme*

#### *Subject No. 50.*

1. Name of the scheme: Scheme for the organisation of three coconut co-operative Marketing Societies in East Godavari District of Andhra Pradesh.
2. Location: Razole, Amalapuram and Kothapet.
3. Object of the scheme: The Co-operative marketing of coconuts in order to relieve the growers from exploitation by merchants and to ensure a fair price to the growers for their produce.
4. Duration of the scheme: One year from date of commencement.
5. Cost of the scheme under the following heads:—
  - 1) *Expenditure*

Non-recurring	Rs. 78,000.00
Recurring	Rs. 18,868.50
Total	Rs. 96,868.50
  - Share of the Committee (50 per cent of recurring expenditure) Rs. 9,434.25
  - Share of the State Government (50 per cent of recurring expenditure plus non recurring expenditure) Rs. 87,434.25
  - 2) Receipts Nil.
  - 3) Net cost Rs. 96,868.50
  - Share of the Committee Rs. 9,434.25
  - Share of the State Government Rs. 87,434.25

6. Remarks of the Secretariat on the proposal

1) The State Government had originally proposed that the total expenditure on the scheme be shared by them and the Committee on the basis of 50:50. It was, however, pointed out to them that according to the "General Conditions applicable to grants made by the Committee", the Committee meets only 50% of the recurring expenditure on marketing schemes.

It was also pointed out to the State Government that the Committee at its 8th meeting (October 1948) had decided that Co-operative Societies for marketing copra and coconuts financed by the Committee should adopt one or both of the following two working methods:—

a) If the members are not prepared to pool their produce and wait for payment, the Society should arrange to sell the produce on arrival on commission basis.

b) If the members are agreeable to pool their produce and accept the final price on *pro rata* quality and quantity basis, the Society may advance a certain per cent of the market price at the time of delivery to the producers.



The State Government have since stated that the condition regarding the sharing of expenditure mentioned above is acceptable to them and that provision has been made in the bye-laws of the Societies for adoption of both the working methods referred to above.

2) The State Government have sanctioned the scheme initially for a period of one year from the date of commencement. (From the details of staff furnished by them it is seen that the scheme is proposed to be implemented on 1-2-1959). It has however been ascertained from the State Government that their financial aid to the Societies will continue up to 31-3-1961. The total recurring expenditure for the period from 1-2-1960 to 31-3-1961 will be of the order of Rs. 22,413.25 and the Committee's share will be 50 per cent of it or Rs. 11,206.63.

The Committee may now decide (1) whether they would approve of the scheme and agree to meet an expenditure of Rs. 9,434.25 for a period of one year from 1-2-1959 and (2) whether they would agree to meet an expenditure of Rs. 11,206.63 on the extension of the

scheme from 1-2-1960 to 31-3-1961, in case the State Government also extend financial aid to the Societies for the above period.

The subject may first be considered by the Marketing and Economics Sub-Committee.

*Copy of letter Rc. 122982/57 C. 1 dated 5-11-1957,  
from Registrar of Co-operative Societies,  
Andhra Pradesh, Hyderabad (Deccan).*

**Sub: Co-operative Marketing - Coconut  
marketing - Programme for 1958-59 -  
Part II Scheme.**

The scheme for the development of coconut marketing in Andhra was included in the Second Five - Year Plan with a total provision of Rs. 1.72 lakhs for the entire plan period under the following heads:-

a) *Non-recurring.*

	Rs.
1. Installation of three "Chula" copra dryers at Rs. 11,000 each.	33,000
2. Cost of three drying yards at Rs. 5,000 each.	15,000
3. Cost of three godowns at Rs. 10,000 each.	30,000
Total.	<u>78,000</u>

b) *Recurring.*

Cost of staff for three Societies for 5 years.	94,342
Total.	<u>1,72,342</u>
	or
	<u>1.72 lakhs.</u>

2. The implementation of the scheme was, however deferred by Government during the years 1956-57 and 1957-58 in their memoranda No. 72002-A1-55-6 dated



3-1-1956 (Industries, Co-operation and Labour Department) and No. 2479-A1 (Coop.)/56-8, Agriculture dated 29-4-1957. Government also suggested that the proposals might be renewed for consideration as Part II Scheme for 1958-59. Accordingly I submit herewith the necessary proposals for 1958-59.

3. The trade in coconut is entirely in the hands of private merchants much to the disadvantage of the growers and the need for co-operative organisation is keenly felt in order to relieve the growers from exploitation by merchants and to ensure fair prices for their produce. In my letter No. 113512/56 C. 1 dated 29-9-1956, while submitting proposals for implementing the scheme during 1957-58, I have explained the need for co-operative organisations for marketing of coconuts. It is proposed to give effect to the scheme during 1958-59, on the same lines as was proposed during 1956-57. The details of expenditure are as follows:

a) *Capital expenditure.*

1. Installation of three copra dryers at Rs. 11,000 each.	33,000
2. Cost of 3 drying yards at Rs. 5,000 each.	15,000
3. Cost of 3 godowns at Rs. 10,000 each.	30,000
Total.	<u>78,000</u>

b) *Recurring.*

The staff required to be employed by each of the three societies proposed to be started, and the cost on them for one year are:

	Rs. nP.
1. One Senior Inspector-Secretary at Rs. 168-10-0 p. m.	2,023.50
2. One Clerk-cum-Typist at Rs. 101-8-0 p. m.	1,218.00
3. One grader at Rs. 82 p. m.	984.00
4. One peon on Rs. 42 p. m.	504.00
5. One Watchman on Rs. 30 p. m.	360.00
6. Contingencies for one year.	1,200.00
Total.	<u>6,289.50</u>

Expenditure on 3 Societies: 18,868.50  
or  
0.19 lakhs

Total cost Rs. 0.97 lakhs.

4. According to the scheme drawn up by the Indian Central Coconut Committee, the total cost will have to be shared equally by the Central and State Governments. Even in the pattern of central assistance for coconut development scheme communicated with Government letter No. Pln. 5/2/56 dated 13-2-57, it is mentioned that 50% of the cost would be met by Government of India and no distinction has been made in respect of sharing recurring and non-recurring expenditure. In the circumstances, it is presumed that the share of Government of India will be by way of subsidy, while that of State Government will be by way of subsidy in respect of (a) (1) and (2) and (b) above and loan in respect of (a) (3) above as already indicated in my letter Rc. 74950/54 P. 2 dated 27-9-55 (vide Government memorandum No. 72002-AI/55-2, Industries, Co-operation and Labour, dated 7-11-1955).

5. The allocation of the expenditure on the above lines, between the State and Central Governments is indicated below:

Details	State Government		Central Government		Total
	Loan	Subsidy	Loan	Subsidy	
	(Rs. in lakhs)				
a) Installation of dryers, drying yards and construction of godowns.	0.15	0.240	—	0.390	0.780
b) Managerial staff.	—	0.095	—	0.095	0.190
	0.15	0.335	—	0.485	0.970

6. I request that Government may be pleased to approve the above scheme and also accord sanction for the employment of three Senior Inspectors in the scale of Rs. 90-4-110-5-120 with 25% special pay to work as



Secretaries of the three coconut marketing societies proposed to be set up free of cost for a period of 1 year from 1-4-1958. I also request that the scheme may be included as part II scheme for 1958-59 and necessary provision made in the budget estimates for that year, in respect of State Government's share of expenditure, as indicated in paragraph (5) of this letter.

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## APPENDIX XVIII

### Secretary's Note

*Subject No. 55.* Amendments to Indian Central Coconut Committee Rules 1945.

According to rule 20 of the Indian Central Coconut Committee Rules 1945, the Committee has in each year to prepare a budget for the ensuing year and has to submit it for the sanction of the Central Government on or before "such date as may be prescribed by them".

Further, under Rule 21 of the above mentioned rules, the Committee may incur such expenditure as it may think fit and may delegate to any of its officers or to the standing Finance Sub-Committee such financial powers as it may consider expedient; provided that no expenditure is incurred by the Committee which is in excess of the sanctioned budget allotment under any major head without the prior sanction of the Government of India.

The Government of India have now decided that all Commodity Committees may be allowed to sanction expenditure not exceeding Rs.5000 on minor schemes which were not anticipated at the time of framing annual budget estimates of these Committees subject to the condition that the schemes are connected with the approved objects for which funds of these Committees could be expended and the pattern of assistance is the same as approved by the Government of India for similar schemes and also that the expenditure in question could be met by diverting savings etc. from the sanctioned budget of the Committee (Vide Annexure).

In view of the above it is suggested that Rule 21 of the Indian Central Coconut Committee Rules 1945 may be amended as follows:—

Delete para 2 of Sub-rule (1) of rule 21 and substitute the following:—

“The Committee may sanction expenditure not exceeding Rs. 5000 on minor schemes which were not anticipated at the time of framing annual budget estimates of the Committee, subject to the condition that the schemes are connected with approved objects for which the Committee's funds could be utilised and the pattern of assistance is the same as approved by the Government of India for similar schemes and further the expenditure is met by diverting savings from within the sanctioned budget of the Committee.

Provided that save with the sanction of the Central Government no expenditure shall be incurred by the Committee which is in excess of the sanctioned budget allotment under any major head except for the above mentioned purposes”.

The Finance Sub-Committee may first consider the suggestion and report to the full Committee.

### ANNEXURE

*Copy of D. O. Letter No. 7-59/58-Com. II dated the 28th November, 1958 from Shri. Ajudhia Prasada, Under Secretary, Indian Council of Agricultural Research, Queen Victoria Road, New Delhi to Secretaries of the Commodity Committees.*

Dear Dr. Gregory,

As you are aware, under the Rules and Bye-laws of the various Central Commodity Committees, the Committees are required to prepare their budgets for ensuing year and submit the same to the Government of India for their sanction. Further, subject to the provisions of the Act/Resolution constituting the Committee and the Rules framed thereunder, the Committees may incur such expenditure as they may deem fit, provided that no expenditure is incurred by the Committees which



is in excess of the sanctioned budget allotment under any major head without the prior sanction of the Government of India. Since the major heads of expenditure generally coincide with the expenditure specified for the various schemes being financed by the Committees or the administration of the Committees or the various Research Institutes/Stations under them, the Committees generally cannot sanction and implement a scheme, provision for which is not included in their Annual Budget as sanctioned by the Government of India. It has now been decided, in consultation with the Ministry of Finance, that the Commodity Committees may be allowed to sanction expenditure not exceeding Rs. 5000 on minor schemes which were not anticipated at the time of framing Annual Budget Estimates of the Committee, subject to the condition that the schemes are connected with approved objects, such as agricultural research, seed multiplication and distribution, marketing and technological research, and the pattern of assistance is the same as approved by the Government of India for similar schemes, and further, the expenditure in question is met by diverting savings etc., from within the sanctioned budget of the Committee.

Suitable action may now please be taken to amend the relevant Rules/Bye-Laws of the Committee accordingly.

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## APPENDIX XIX.

### Secretary's Note

*Subject No. 57. Enhancement of power delegated to Secretary regarding grant of honorarium.*

According to item 12 of the schedule of powers delegated to the President and Secretary of the Committee, the undersigned is competent to sanction the grant or acceptance of an honorarium or fee and also to sanction the undertaking of work for which an honorarium or fee is sanctioned, up to a limit of Rs. 50/- in any individual case.

In all cases exceeding Rs. 50/- but under Rs. 1000/- sanction of the President of the Committee has to be obtained.

The Ministry of Food & Agriculture, Government of India (Department of Agriculture) I. C. A. R. have in their letter No. 7-19/58-Com. I. dated 23-10-1958 (Vide annexure) stated that the powers delegated to the Secretary of the Committee in the matter are too inadequate and this results in many references being made to the President of the Committee. It has accordingly been suggested by the Government of India that a proposal may be placed for the consideration of the Committee at this meeting to enhance the existing powers of the Secretary in the matter to Rs. 100/- in any individual case.

Item 12 of the schedule of powers mentioned above may therefore be amended to read as follows:-

<i>Sl. No.</i>	<i>Powers</i>	<i>Limitation and Restriction if any President</i>	<i>Secretary</i>
12	To sanction the grant or acceptance of an honorarium or fee and to sanction the undertaking of work for which an honorarium or fee is sanctioned.	Upto Rs. 1000/- in any individual case.	Upto Rs. 100/- in any individual case.

The Finance Sub-Committee may first consider the matter and report to the full Committee.

### ANNEXURE

*Copy of letter No. 7-19/58 Com. I. dated 23rd October 1958 from Shri Ajudhia Prasada, Under Secretary to the Government of India, Ministry of Food & Agriculture, (Department of Agriculture), Indian Council of Agricultural Research, New Delhi to the Secretaries of Commodity Committees.*

*Subject:—* Commodity Committees – Delegation of powers to the Secretaries of the Commodity Committees to sanction



the grant or acceptance of an honorarium or fee and to sanction the undertaking of work for which an honorarium or fee is sanctioned.

I am directed to say that it is felt that the powers delegated to the Secretary in the matter of sanctioning (i) grant or acceptance of an honorarium or fee and (ii) the undertaking of work for which an honorarium or fee is sanctioned are too inadequate and result in many references to the President of the Committee. It is accordingly suggested that a proposal may be placed for the consideration of the Committee at its next meeting to enhance the existing powers of the Secretary in the matter upto Rs. 100.

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## APPENDIX XX

### Secretary's Note

*Subject No. 60. Central Commodity Committees - conditions of service to be offered to the temporary employees of the Committee appointed to posts created for a period of three years or less.*

The Ministry of Food and Agriculture (I.C.A.R.) Government of India, in their letter No. F 6-137/56 Com. II dated 15/17-9-1956 had suggested the incorporation of the following terms and conditions in the offer of appointments made in filling up all future posts under the Committee and while notifying vacancies either to the Press or to the Employment Exchanges:—

(i) The person appointed to a post will hold it on an unspecified tenure subject to its termination with the Committee / Institute / Research Station itself or on his superannuation at the age of 55 years whichever event takes place earlier;

(ii) "His services would be terminable at three months notice on either side."

Accordingly, the above clauses are being incorporated in the terms and conditions offered to all employees of

the Committee appointed since then to any posts under the Committee. The Ministry of Food & Agriculture (I.C.A.R.) in their letter No. 3-81/58 Com. I. dated 30-10-1958 have now stated that the Committee may consider the desirability of inserting the following clause in the terms and conditions offered to the temporary employees of the Committee appointed to posts created for a period of three years or less.

“His services would be subject to termination by one month's notice on either side without assigning any reason”.

Since there are certain posts under the Committee, the period of which is three years and less, the condition of one month's notice may be stipulated in such cases only instead of 3 months as at present.

The subject will first be considered by the Finance Sub-Committee which will report to the full Committee.

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## APPENDIX XXI

### Secretary's Note

*Subject No. 69.* Central Coconut Research Station, Kasaragod – Rules regulating the use of Station Waggon.

In the Scheme for the development of Central Coconut Research Station, Kasaragod, the President, Indian Central Coconut Committee in I. C. A. R. U/O. No. 7-90/56-Com. I dated 11-3-1957 had accorded sanction for the purchase of a station waggon and a mobile van for that station. In the first instance it was proposed to purchase a Dodge Kingsway Station Waggon at a cost not exceeding Rs. 20,000, but in pursuance of Government of India's instructions contained in their circular letter No. 12-53/57 Est. (1) dated 28-6-1957, communicated in the President, Indian Central Coconut Committee's D. O. No. 3051/VI/57 dated nil July 1957 a cheaper Hindustan Traveller type station waggon only was purchased on 13-8-1958.



A set of rules regulating the use of the station waggon was framed by the Joint Director, Central Coconut Research Station, Kasaragod on the model of the rules in force at the Sugarcane Breeding Institute, Coimbatore and the Central Rice Research Institute, Cuttack. These rules have been slightly modified by me by the insertion of rules 2 to 4 found in the Government of India's rules regulating the use of staff cars and by other minor alterations and a copy of the rules as so modified is attached to this note for the Committee's approval. The hire charges indicated in the rules will almost cover the running cost of the waggon.

The subject will first be considered by the Finance Sub-Committee which will report to the full Committee.

**Rules regarding the use of the Station Van at  
the Central Coconut Research Station,  
Kasaragod**

*I. Controlling Officer.*

1. The Station Van (Hindustan Traveller Car) will be under the administrative control of the Joint Director, who will, with the help of the Farm Superintendent, be responsible for its proper use, maintenance and for regulating its trips according to rules.

2. The Farm Superintendent will maintain

(a) a log book showing

(i) particulars of journeys performed by the car, both on duty and otherwise (non-duty and private journeys should be clearly shown as such) and

(ii) a record of repairs, replacements and spare parts;

(b) a register to show the cost of petrol etc., consumed, and all incidental receipts and expenditure; and

(c) an inventory of equipment.

The inventory should be checked by the Joint Director every month and any loss arising out of negligence or fault recovered from the person concerned.

3. The Joint Director will have the vehicle tested every six months regarding fitness for journeys and place a report on record. He will also submit a half-yearly report to the Secretary, Indian Central Coconut Committee on the expenditure incurred on the maintenance of the car.

4. On Transfer from his post, the Joint Director will ensure that the vehicle is handed over to his successor with complete equipment and full complement of spare parts, spare wheels, tyres and tools, and have the fact mentioned in his charge report.

## *II. Use of Station Waggon for non-official purposes.*

5. The Station Van will be available on payment of hirecharges for conveyance of (i) Children and other relatives of the staff members from their residences to Educational Institutions in the town in the mornings and back in the evenings, (ii) the staff members residing in the Kasaragod town and its neighbourhood, (a) from their residences to the Research Station in the mornings and back in the evenings (at 11.40 A.M. on Saturdays) and (b) from the Research Station to their residences at 11.40 A.M. and back to the Research Station at 2 P.M.

6. The van will be available for the above purposes only on working days of the Educational Institutions or of the Research Station as the case may be.

7. Charges per calendar month irrespective of the number of working days of the Educational Institutions or of the Research Station as the case may be, will be as shown below provided that students pay only 50% of the amounts.

### *Hire charges per calendar month for, one trip.*

	Rs.
For distance upto 1 mile	2/-
For more than 1 mile but upto 2 miles	3/-
For more than 2 miles but upto 3 miles	4/-
For more than 3 miles but upto 4 miles	5/-

*Note:-* (1) "DISTANCE" means the distance between the C. C. R. S. (New Laboratory building)



and the residences or between the residences and Educational institutions, as the case may be, along the shortest route

(2) "TRIP" means one to and fro journey.

8. Staff members will be responsible for payment of hire charges on their behalf as well as on behalf of their children or other relatives.

9. If any member of the staff is absent on leave or on tour for a continuous period of not less than 15 days (including holidays) in a calendar month, only 50% of the charges normally payable need be paid for that month. Similar concession for continuous absence is also available to students and others attending Educational Institutions.

10. Charges for any month will be recovered from the Pay Bill for the succeeding month.

11. Privilege of using the Van according to the above rules is not transferable.

12. (a) The Van can also be hired by the staff for their bonafide use on payment of hire charges and subject to the conditions shown below provided the van is not otherwise engaged and the services of the Driver are available. The Van will not, however, be available for going to cinema shows etc.

(i) The indent for use of the Van should be sent to the Farm Superintendent at least six hours in advance.

(ii) The indent should contain the following particulars.

(a) The date and time when the Van is required.

(b) The date and time of return.

(c) Place and purpose of the visit.

(d) Nature of business.

(e) Approximate mileage to be covered.

(f) No. of persons travelling in the Van.

(g) Approximate load to be carried.

(iii) If two or more indentors require the Van at the same time, it will be made available to the first applicant only.

(iv) Hire charges have to be paid at Rs. 0/30 per running mile or part thereof (total distance run after the Van is taken off the garage till it is brought back will be the "running distance"), subject to a minimum of Re. 1/-

*Note:-* The mileage at the start and at the completion of the journey shall be noted by the Driver and got attested by the party.

(v) When the Van is required for use between 5-30 P. M. and 9 P. M. or on holidays of the Research Station an extra charge of Re. 1/- will have to be paid by the indenter. The Van will not be available for use between 9 P. M. and 7 A. M.

(vi) The interval between the taking of the Van out of the garage till it is brought back to the garage shall not exceed two hours, excluding detention time due to breakdown.

(vii) All bookings are provisional subject to cancellation in special circumstances by the Joint Director giving an hours notice to the party concerned. The parties can also cancel the booking giving an hour's notice.

(viii) The charges payable should be paid to the Driver on the same day.

(b) Subject to the conditions mentioned in clause (a) above and on payment of the hire charges the Van can be hired by servants and members of the Committee when they visit the Research Station on duty, provided a week's notice is given.

13. When the Van is plying for the purposes mentioned in para (2) above, any member of the staff or the members of his family can travel in the Van on payment of charges at Rs. 0/10 per mile to the Driver provided there is sufficient accommodation.

14. The Driver shall maintain proper account of the amounts collected by him under clause a (viii) of Para 12 and under para (1 ) and shall remit the amounts to the office on the same day or the next working day.

### III. *Use of Station Waggon for official purposes.*

15. The Van may be used for bonafide "official purposes" within Kasaragod limits or outside.



For the above purpose, use of the car (i) by distinguished visitors to the Research Station and (ii) by the officers of the Committee for going on official duties or such other purposes considered as "official" by the Joint Director, will be treated as "official purposes" for use of the Van. Officers using the Van for official purposes should note in the log book the mileage at the start and at the completion of the trip and certify that the trip was on official business. Officers using the Van for official purposes will not be eligible to claim mileage allowance for the journey.

16. The Joint Director may permit the use of Van at all hours in cases of emergency for carrying patients related to the members of the staff of the Research Station to Hospitals or other places in Kasaragod. Hire charges at rates indicated in clause (a) (iv) of para 12 shall be paid by the staff member concerned.

17. The officers using the Van shall see that the Van is not overloaded or damaged or spoiled on account of careless loading or carriage of goods liable to spillage.

IV. *Working hours and overtime allowances to Drivers.*

18. The normal working hours of the Driver will be from 7-30 A. M. to 5-30 P. M. Overtime allowance (as admissible to staff car Drivers in accordance with the instructions contained in the Ministry of Finance O. M. No. F. 11 (45)-EG. 1/46 dated 16-9-1947 as amended from time to time) will be paid to the Driver on production of a certificate from the Joint Director that it has been earned. But no overtime allowance will be paid to the Driver when the van is taken out for official purposes mentioned in Rule 15.

19. The Research Station or the Indian Central Coconut Committee will not be responsible for any damage, accident or delay in transit or any other inconvenience caused to the users due to reasons beyond their control.

20. The Van will not be available for hire to private parties.

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